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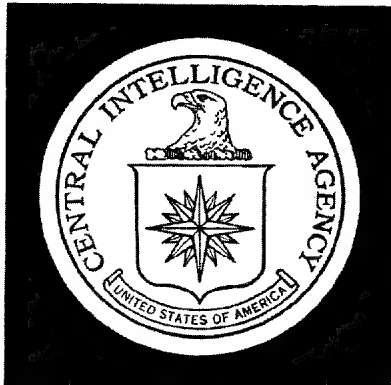
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Intelligence Handbook

25X6D



BRAZIL

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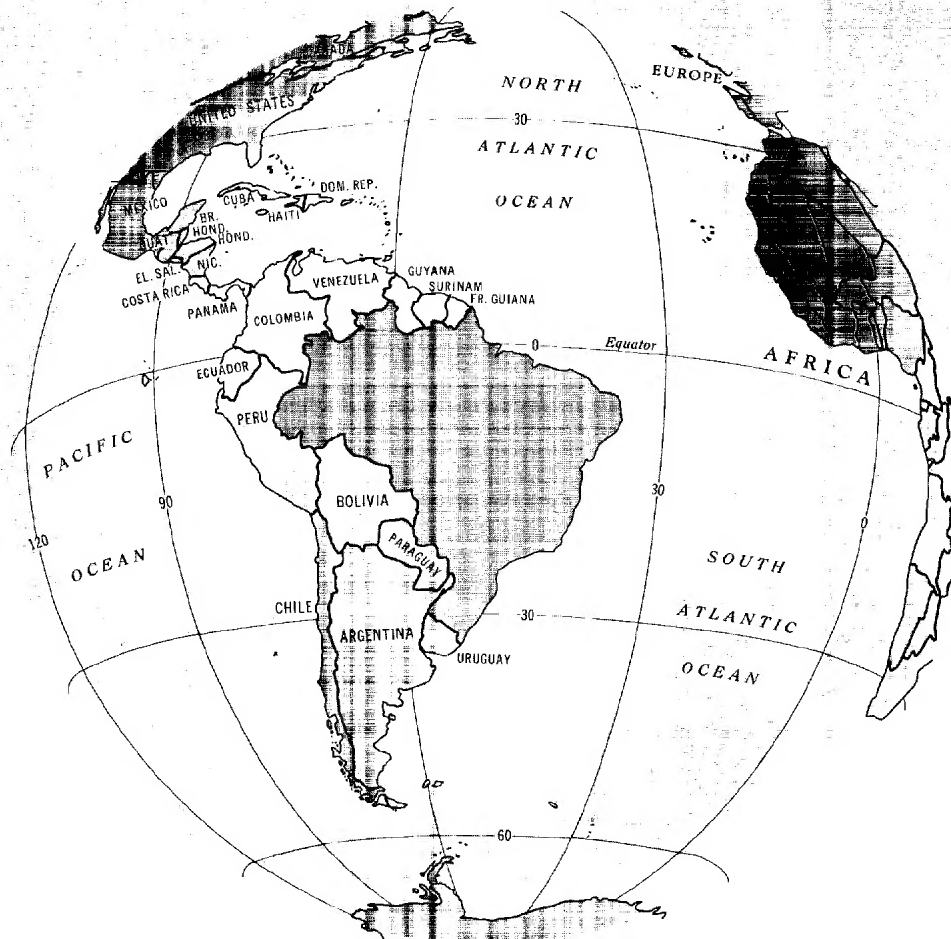
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February 1968

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BRAZIL



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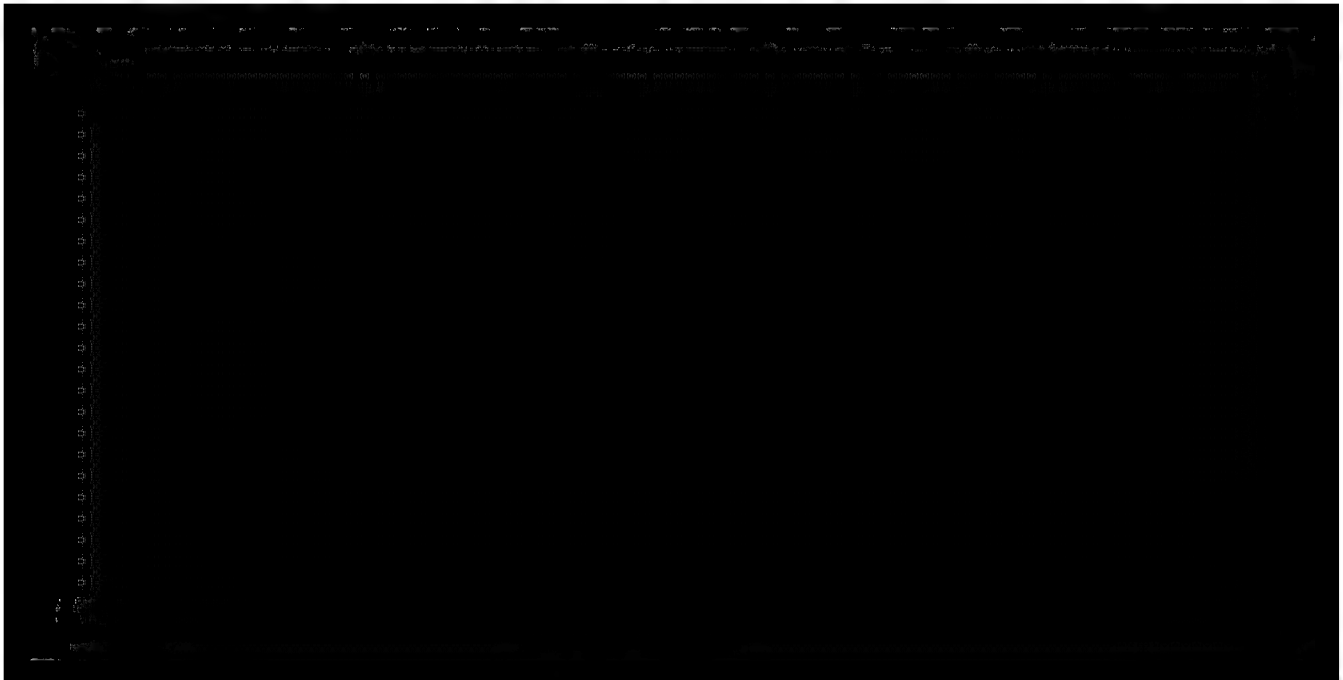
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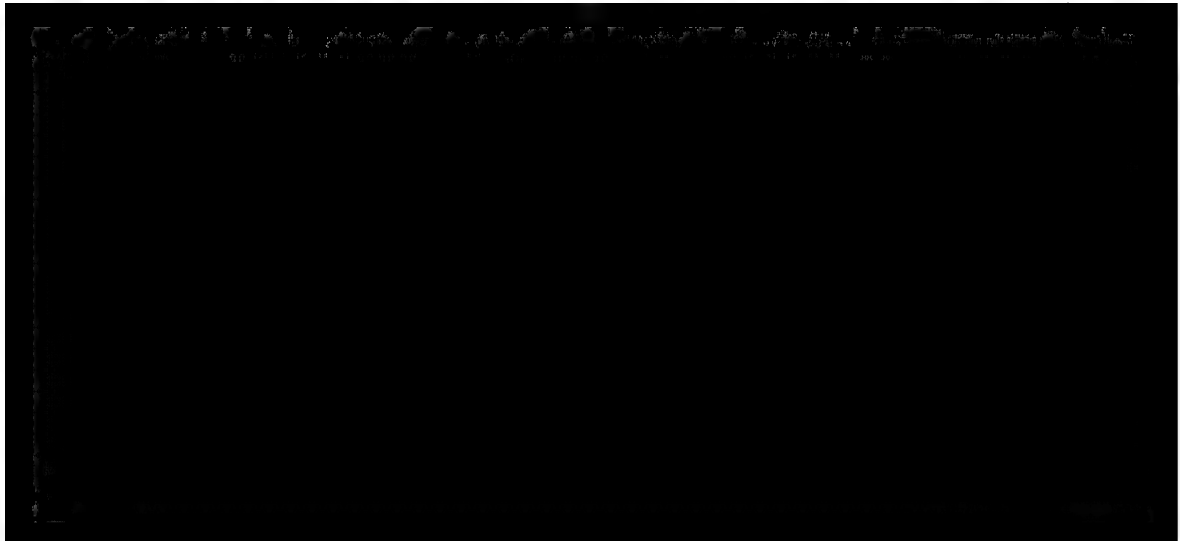
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I. Introduction

Brazil, the fifth largest country in the world, has an area greater than that of the continental United States, a population equal to that of the rest of South America, and a culture predominantly Portuguese in origin. It is located in the eastern half of South America and borders all but two of the nations of the continent. It is a land of immense dimensions, dramatic diversities, growing strength and unity, and with a determination to play an international role commensurate with its power potential.

Brazil is a federal republic composed of 22 states, 4 territories, and the Federal District. For practical purposes, however, it is usually treated in five geographical regions, the North, Northeast, East, South, and West-Central, which are distinguished by variations in topography, climate, and economy. The greater part of the country consists of highlands which fall sharply to a narrow coastal plain in the east and rather gradually to the west to form an extensive and almost level plain for the vast rain forests of the Amazon and its tributaries.

In 1967 there were some 85.2 million Brazilians. Their distribution, racial composition, and way of life differ widely, but most of them share the Roman Catholic faith, the Portuguese language, and values related to national pride and destiny. Eighty percent of them live within 200 miles of the Atlantic coast, where the principal cities are situated; relatively few have penetrated far inland. To stimulate westward movement and development the national capital was transferred from Rio de Janeiro to the newly built inland city of Brasília in 1960.

If the country were able fully to exploit its natural resources, it could become one of the most prosperous nations in the world. It is well endowed with minerals, has a well-established agricultural base with heavy emphasis on export crops such as coffee and cocoa, and it has a substantial labor supply. On the other hand, Brazil's topography and climate retard progress. The transportation system, hampered by lack of navigable waterways connecting the seacoast with the hinterland except for the vast and inhospitable Amazon valley, has not advanced sufficiently to adequately exploit and market goods. Progress in some sectors of the economy, such as industry, and in some geographical regions, as in the South and East, has been notable, however, but population increases have absorbed most of the gains.

The three principal racial groups, European whites, African Negroes, and South American Indians, have intermingled and interbred to such an extent that racial or ethnic background plays only a minor role in social and economic advancement. Old cultural and political patterns are being replaced by new ones more suited to the challenges of an exploding population, industrialization, and a growing demand for social justice and an improved standard of living.

The gap between the way of life of the relatively small upper class and that of the underprivileged masses is great. About 50 percent of the population is illiterate, poor, and effectively excluded from the political process. This is especially true in rural areas where some 60 percent of the population lives. Attempts to improve their situation through economic development have been underway since the 1930's, but only during the last eight or nine years have they sought a role in politics. Although Brazil's political institutions are still not representative of the broad masses and the political parties serve only in a very limited way as channels for permitting the entry of new groups and interests into the political arena, the balance of power within the national government is shifting away from the older agrarian interests to the urban-industrial and professional upper and middle class. At the same time the urban working class is gradually being organized and is playing an increasingly important role in politics.

Conservative forces, nevertheless, feel confident in their own strength and in the support of the armed forces, staunch and reliable defenders of the constitutional process. However, a radical nationalist left has emerged, challenging the vested interests and seeking to mobilize popular support for the reform of existing social and political institutions.

National self-assertion, as expressed in pride in history, intellectual, artistic, and economic achievements, and in efforts to assume an independent and leading role in hemispheric and world affairs, has been growing for some time especially among the upper and middle classes and has now reached part of the organized working class. It is frequently expressed in an increasing demand for economic independence from the United States and for nationalization of public utilities and basic industries.

There is a polarization of public opinion regarding the United States. On the one hand, the United States is acknowledged as the principal trading partner, as the source of credit and skills for economic development, and as the representative

of a material culture to which many Brazilians aspire. On the other hand, the dominating role played by the "northern colossus", its overwhelming wealth, and its value system presumed to be exclusively materialistic, are causes which can be found at the roots of anti-North American sentiment and on which extremists capitalize. Anti-North American formulas are being used with increased frequency by political parties and are the principal theme of the Communists, both Russophile and Sinophile. The Communists, of course, capitalize on nationalist sentiments and recruit a number of their popular supporters from among nationalists, making it extremely difficult to differentiate between subversive Communist elements and genuine nationalists.

Although the Communist Party has been outlawed since 1947, Communists have had a powerful press and strong influence in most political and social institutions. Their strongest influence is evident in labor unions and student organizations from where they point their fingers to the United States as the principal cause of social and economic ills.

The Communists are established in the coastal Northeast, the oldest and poorest section of the country where the large rural population, composed mostly of plantation workers, has been breaking away from traditional institutions without creating new ones to cope with their problems. Here, and sporadically in other parts of the country, armed clashes between land-hungry peasants and landowners occur. Although regionalism is strong and unrest in the Northeast is growing, it is unlikely that any particular region alone will have a decisive influence on political development in the near future.

II. Historical Background

A. Chronology

This chronology is essentially the chronology to be found in the NIS General Survey, Brazil.

- | | |
|----------------|---|
| 1500 | Pedro Alvares Cabral, an explorer on his way to India, lands in Brazil and claims it for the Portuguese crown. |
| 1600 | Bands of gold seekers begin century-long series of expeditions into the interior resulting in vast expansion of Brazil's frontiers. |
| 1822 | Dom Pedro, son of King of Portugal and regent in Brazil, refuses to return to Portugal and proclaims Brazilian independence. |
| 1864 -
1870 | Combined forces of Brazil, Argentina, and Uruguay win costly war against Paraguay. |
| 1888 | Complete emancipation of slaves decreed. |
| 1917 | Brazil declares war on Germany. |
| 1929 | World economic upheaval causes a collapse of the coffee market. Brazil plagued by financial and political disorders. |
| 1930 | Revolution brings Getúlio Dornelles Vargas to power as provisional president. |
| 1934 | Constituent Assembly approves new constitution and elects Vargas president. |
| 1937 | Vargas becomes dictator. |
| 1942 | Brazil declares war on Germany and Italy. |
| 1945 | Military overthrow Vargas dictatorship. |
| 1946 | General Eurico Gaspar Dutra inaugurated president. New constitution promulgated. |

1947 Communist Party outlawed. Brazil breaks relations with USSR.

1951 Vargas inaugurated as president.

1954 Bowing to military demands, Vargas resigns and commits suicide.

1956 Juscelino Kubitschek inaugurated as president, João Goulart as vice president.

1960 Capital moved to Brasília.

1961 Jânio Quadros inaugurated as president, João Goulart as vice president in January. Quadros resigns in August blaming domestic and foreign pressures; succession of Goulart opposed by many of military. Compromise by Congress permits Goulart succession in September; constitution amended to introduce parliamentary government, stripping president of important powers. Relations with USSR restored in November.

1962 Communist Party dissidents in February form pro-China Communist Party of Brazil (CPB).

1963 Plebiscite in January restores presidential system and full power to Goulart.

1964 Goulart, in March, expropriates certain unused private lands and all privately owned Brazilian oil refineries. Military and civilian leaders, convinced that Goulart with the help of Communist and leftist ultra-nationalist allies is seeking to increase his power illegally, move against him. Castello Branco is elected by the Congress in April to serve remainder of Goulart's term (until 31 January 1966). New government initiates anti-inflationary measures and extensive reform program. Brazil breaks relations with Cuba in May.

1965 Brazil, in April, contributes soldiers to Inter-American Peace Force during the Dominican Republican crisis. Gubernatorial

elections in October lead to a political crisis resolved by the issuance of Institutional Act II abolishing all political parties and laying the basis for restructuring the political system. Shortly later two broad parties are formed: the pro-government National Renewal Alliance (ARENA) and the opposition Brazilian Democratic Movement (MDB).

1966 Arthur da Costa e Silva is elected president in October. ARENA party maintains its majorities in congressional elections in November.

1967 Congress passes stringent new press law in January. President decrees sweeping National Security Law in March. Government promulgates new constitution in March embodying many principles advocated under the Castello Branco regime. Costa e Silva is installed as president on 15 March.

B. History

Brazil was discovered in 1500 by Pedro Alvares Cabral, a Portuguese navigator, who landed at Porto Seguro in the southern part of the present state of Bahia. He claimed the new territory for King Manuel of Portugal and called it Vera Cruz (True Cross), a name eventually changed to Brasil, after the red dye-wood pau-brasil, brazilwood, found and exported by the early Portuguese settlers.

During the thirty years following the discovery of Brazil, small Portuguese communities gradually grew up along the coast. Reports of the vast riches of Peru and the discovery of gold in Brazil, in small but promising amounts, led to an increase in Portuguese immigration and induced King João III to initiate colonization under royal grants. Some fifteen "captaincies," extending from the coast inland to Spanish-held territory, were laid out in 1534 and granted as hereditary holdings to governors who had almost unlimited authority within their respective domains.

The excessively decentralized captaincy system was not a success. To inject more vigor into the colonies and provide protection against pirates and other marauders, King João decided in 1548 to place one central political authority,

answerable directly to the Crown, over the captaincies. Therefore, he purchased the captaincy of Bahia and appointed Tomé de Sousa as governor-general of the colony. The governor arrived at the bay of Todos os Santos in March 1549, and established the city of São Salvador (Bahia), which was the colonial capital until 1763 when Rio de Janeiro superseded it. Colonial development went forward at a faster pace under the governors-general. In 1567 the city São Sebastião do Rio de Janeiro was established.

After 1580, when King Philip II of Spain incorporated Portugal into the Spanish Empire, colonizing activities in Brazil received scant attention and the colony became the target for attacks by Philip's enemies. Sea marauders under British, French, and Dutch flags harassed the coast and attempted to occupy territory.

Following the restoration of Portuguese independence in 1640, the colony progressed rapidly, and there was a notable growth of national feeling in Brazil. The discovery of gold and diamonds in important quantities in the interior precipitated a rush to the regions of Mato Grosso, Minas Gerais, and Goiás, resulting in their settlement and exploitation.

From 1750 to 1777, Portuguese colonial affairs were under the direction of the Marquis of Pombal, whose enlightened policies and intelligent promotion of the economic and commercial welfare of the colony and the empire earned for him the title of "the great marquis." Local governors, however, far from the scrutiny of the crown officials, were often oppressive, and local resentment sometimes reached a high pitch. This situation, combined with the sharply whetted feeling of nationalism that had developed during the previous century and a half, fostered a growing desire for independence in Brazil. The first movement for independence came in 1789 in Ouro Preto, then the capital of Minas Gerais. The leader of the movement was an enthusiastic idealist, Joaquim José da Silva Xavier, better known by his nickname, Tiradentes ("Tooth-puller"), because of his occasional practice of dentistry. He and the other members of the movement were finally betrayed, jailed, and executed. Tiradentes' name became symbolic of Brazilian independence.

In 1808 Prince Regent João VI moved to Brazil after Napoleon invaded Portugal. Establishing himself in Rio de Janeiro, Dom João instituted many reforms of great benefit to the country. His was a reign of commercial, scientific, artistic, and literary awakening in the country.

In 1815, Portugal was freed from French domination, and Brazil was declared a kingdom under the Portuguese monarch. The next year, on the death of his mother, Queen Maria, Dom João became King João VI. For five years he ruled Portugal from Brazil. His autocratic temperament at times made him unpopular in Brazil, and a strong element in Portugal demanded that Brazil be returned to her colonial status; also, that the King return to Portugal or lose his crown. Rather than lose the Portuguese crown, he returned to Portugal in 1821, leaving his son, Dom Pedro, to govern Brazil as regent.

Ignoring orders from Portugal to return, young Dom Pedro, on September 7, 1822, declared Brazil's independence and became constitutional Emperor of Brazil. The new regime was inaugurated without violence or bloodshed and with popular enthusiasm.

The new nation had initial difficulties. In 1822 Dom Pedro dissolved the Constituent Assembly, which appeared about to adopt a liberal and almost republican constitution with the Emperor as titular head. Sentiment in the country was not greatly mollified by the Emperor's proclamation in 1824 of a liberal constitution he had drafted. This constitution, with amendments, was the one under which Brazil was governed until the proclamation of the Republic in 1889. Liberal opposition was further strengthened by the loss in 1828 of the Cisplatine Province -- now the Republic of Uruguay. Finally, in 1831, Dom Pedro, worn out and disheartened, abdicated in favor of his five-year-old son, Dom Pedro II, with José Bonifacio de Andrada as regent.

Ten years of government by regents representing both of the then-existing parties failed to quiet the country; so the young Emperor, though but fifteen years old, was declared of age in 1840 and proclaimed constitutional Emperor. His fifty-year reign was one of the most important periods in the country's history. With able assistance Dom Pedro II succeeded in bringing about the internal pacification and consolidation of the country, and in scoring diplomatic achievements that increased Brazil's prestige abroad. He encouraged immigration, assisted in the construction of railroads, expanded agriculture, industry, and commerce, and stimulated the intellectual and cultural development of the country. Two foreign wars of consequence were fought during his reign. In the first, in 1851, Brazil joined forces with a faction in Argentina to bring about the downfall of the dictator of that country. In the second, 1865-70, Brazil, in alliance with Uruguay and Argentina, defeated Paraguay.

In 1831, a law was passed prohibiting slave trade, but it wasn't until 1850 that the government succeeded in controlling it entirely. In 1888, all slaves were declared free. Planters, who lost slaves without compensation, joined the republicans and the army in agitating for the overthrow of the monarchy. In 1889, a coup d'etat occurred and a federal republic was proclaimed. Dom Pedro II quietly left the country.

A provisional government under General Manuel Deodoro da Fonseca was installed until a constitution could be formulated and a president chosen in accordance with its terms. Early in 1891 General da Fonseca was elected president, only to be succeeded in November of the same year by the vice President, Floriano Peixoto. Commencing with the elections of 1894, a series of civilian presidents was elected.

From 1930 to 1945, the dominant figure in Brazil was Getúlio Vargas, placed in power by a revolution in 1930. In 1942, Brazil declared war on Germany and Italy and was the only South American country to send troops overseas. Brazil also gave naval and air support and provided bases and strategic raw materials to the Allies.

In October 1945 the military overthrew Vargas shortly before presidential elections (deferred since 1937) were to take place. General Eurico Gaspar Dutra (1945-1950) was elected president and a new, liberal, and progressive constitution was formally promulgated September 18, 1946. After Vargas' reelection in 1950, economic and political difficulties became increasingly complex; in 1954 Vargas committed suicide and Vice President João Café Filho became head of the government.

The national elections in 1955 were won by Vargas' political heirs, the leaders of the two parties he had founded; Juscelino Kubitschek of the Social Democratic Party (PSD) became president, and João Goulart, head of the Brazilian Labor Party (PTB), his vice president. Some of the military opposed their taking office, but a counter coup led by War Minister Henrique Teixeira Lott ensured their inauguration. Kubitschek, whose campaign slogan had been "50 years' progress in 5," greatly accelerated economic development projects but neglected social welfare. He constructed, at great expense, the new capital of Brasília. Kubitschek's term, however, was marked by a steep rise in the cost of living and increased social unrest. In the election of 1960 the voters gave a landslide victory to São Paulo Governor Jânio Quadros, the "man with the broom," who had promised to sweep out the corruption and inefficiency which had grown during the three decades following Vargas' accession to power.

In his impatience with congressional and other forces that were frustrating his reform efforts, Quadros, in what many considered a ploy to gain a free hand, tendered his resignation. To his surprise it was accepted, and he departed after only 7 months as president. The resulting crisis brought the country to the brink of civil strife between military constitutionalist forces and military and other elements unwilling to allow Goulart to take power; he had sought Communist support and had narrowly won reelection as vice president. The crisis was settled by a typically Brazilian compromise: a modified parliamentary government with circumscribed presidential powers was instituted as a prerequisite to Goulart's taking office.

Goulart's conduct during his 31 months in office confirmed the misgivings of those who had opposed his accession. Even after a popular referendum in January 1963 had restored full presidential powers, he proved a most inept and irresponsible administrator, incapable of coping with the serious economic and political problems he had inherited. Inflation mounted rapidly, the country's foreign indebtedness reached critical proportions, foreign investment dwindled to a trickle, and economic growth was sharply reduced. Goulart called for "basic reforms," but the opposition was convinced that he wanted to revise the constitution so that he could continue in power beyond the end of his term in January 1966. Moreover, he permitted and even encouraged infiltration of the labor movement by Communists and other extreme leftists in return for their help in exerting pressure on the Congress by political strikes and demonstrations. Among his closest advisers were a number of Communists and other Marxists, and he abetted extensive Communist infiltration not only in the trade unions but also in journalism, education, and in many government agencies. By early 1964 there was a widespread conviction that Brazil was drifting toward economic catastrophe, that Goulart was incapable of governing, and that he perhaps planned soon to set up either a dictatorship of the Peronist type or an authoritarian regime which might fall under Communist domination. After Goulart had condoned political agitation and mutinous attitudes on the part of noncommissioned officers of the armed forces and after he endorsed an ultimatum by the Communist-dominated Workers' General Command to the Congress to accept drastic reforms by 20 April 1964 or face a general strike, the military, joined by leading state governors, revolted against him on 31 March. His support evaporated within a day, and his flight into exile met with approval or at least apathy among the great majority of the population.

The Brazilian military has several times intervened in national politics to overthrow dictatorships or otherwise assure the continuation of the democratic process. It has always restored power to civilian authority after a short period.

Humberto Castello Branco, a highly respected army general who had played a leading role in the anti-Goulart plot, was chosen by the Congress to serve for the remainder of Goulart's term -- until January 1966; the term was later extended by Congress to 15 March 1967. The new President pursued moderate reformist policies with a shift towards greater private participation in the economy. He filled the key cabinet posts with experienced, non-political technicians but relied to a great extent on former military colleagues, particularly those of the so-called "Sorbonne group" -- senior officers associated with the Superior War College -- for advice on policy matters.

The government focused its early efforts on checking subversion and eliminating corruption. Several hundred politicians, subversives, and other persons charged with illegal activities were stripped of their political rights, and many public officials, including a substantial number of congressmen, were ousted from office for similar reasons. Political activities by labor unions and student groups were sharply curtailed. Congress, with many of the opposition leaders purged from its ranks, approved most of the administration's bills.

The government instituted a sweeping financial stabilization and austerity program designed to bring the rampant inflation under control. The program was only partially successful. Major reforms were initiated in agriculture, housing, and the banking system, as well as in other fields, but with varying degrees of progress, ranging from slight to moderate.

Although President Castello Branco exercised power with relative restraint, his period of rule was marked by strong executive authority embodied in four Institutional Acts and more than 30 Complementary Acts. In October 1965, for example, Institutional Act II abolished all political parties then in existence.

The new Constitution approved by Congress in January 1967 includes many of the special powers employed by Castello Branco. The Constitution was intended to codify the authority believed necessary for Castello Branco's successor, Arthur

de Costa e Silva, a retired army marshal, to continue the moderate reforms instituted after Goulart's ouster in 1964. Costa e Silva, who took office on 15 March 1967, has given strong indications of following the same general policies as his predecessor.

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III. Physical Geography*

See Map 55894

A. Introduction

Highlands, consisting mainly of tablelands and dissected plateaus, cover almost 60 percent of Brazil. Mountain ranges rise above the general surface level in only a few places -- mostly near the east coast where they have hampered the development of transportation lines into the interior. Lowlands and valleys, situated primarily within the Amazon Basin, occupy the remaining 40 percent of Brazil. A narrow, discontinuous coastal plain extends along the Atlantic coast, and lowland areas occur in Rio Grande do Sul and southwestern Mato Grosso.

The climate of Brazil reflects the tropical location of most of the country. The tropical climate is ameliorated somewhat by elevation in the highlands. Only in the three southernmost states is there a subtropical climate.

Tropical rain forest covers most of the Amazon Basin and the windward slopes of the east coast highlands. A large part of eastern and southern Brazil was originally covered by tropical semideciduous forest. These stands have been largely cleared for cultivation or grazing, but scattered tracts of second growth remain. A distinctive Paraná pine forest grows in the cool highland areas of southern Brazil. Many of these stands, too, have been cut over or cleared. Savanna extends over large areas in the interior highlands, while thorny scrub is characteristic of semiarid northeastern Brazil. Prairie grasslands are confined mainly to the extreme southern part of the country.

For the purposes of this study Brazil is divided into five physical regions: (1) the Northern Region, (2) the West-Central Region, (3) the Northeastern Region, (4) the Eastern Region, and (5) the Southern Region.

The Northern Region corresponds essentially to the Amazon Basin and includes slightly more than half the country. It is sparsely populated, and the collection of forest products is the principal economic activity.

*A more detailed study of the physical geography of Brazil is available in manuscript form in the Geography Division, Office of Basic and Geographic Intelligence.

The West-Central Region includes the interior highland area commonly referred to as the Central Plateau. It is a sparsely populated region of savannas devoted primarily to open-range cattle grazing.

The Northeastern Region includes the coastal states that form the northeastern bulge of Brazil. The humid, densely populated coastal sector of this region is an important center of sugar production; the semiarid interior is an area of open-range livestock grazing and cotton and sisal production that is subject to periodic calamitous droughts.

The Eastern Region is a complex area of rugged hills, basins, and low mountains. It has pockets of dense population, particularly in the southern part, and land use runs the gamut from subsistence farming to heavy industry. Dairying, mining, and the cultivation of coffee, cacao, and sugarcane are important economic activities.

The Southern Region, the smallest of all, is the most populous and the most economically developed part of the country. It leads in the production of industrial goods, lumber, and a variety of agricultural products.

B. Northern Region

See Map 55895

1. General

The Northern Region corresponds to Amazonian Brazil and includes the states of Acre, Amazonas, and Pará; the territories of Amapá, Rondônia, and Roraima; and parts of the states of Goiás, Mato Grosso, and Maranhão. The region as a whole has not been accurately mapped, and very little is known about sizable areas remote from the principal navigable rivers. The Amazon Flood Plain -- the stereotype Amazon of popular literature -- comprises only a very small percent of the total area. Most of the region lies at elevations above flood level and is called the terra firme (firm ground) to distinguish it from the flood plain. A relatively narrow coastal plain north of the Amazon Delta separates the seaward margin of the terra firme from the Atlantic shore.

2. Amazon Flood Plain

a. Terrain and Drainage

The Amazon Flood Plain consists of the lowlands that border both the main river and the lower courses of its principal

tributary streams. The flood plain is narrow along the upper course of the Amazon but attains a width of over 125 miles near the river mouth. Lines of bluffs mark its outer margins (see Figure 1). The configuration of the flood plain is irregular and constantly changing, as the river at flood stage frequently shifts its course -- abandoning old channels and forming new ones. Side channels join and rejoin the main channel at varying intervals, enclosing numerous islands. Natural levees of varying width rise above the general level of the flood plain, bordering the present channel of the river and also many of the former channels. The levees are submerged only during the highest floods.

Upstream from Manaus there are two periods of high water; a major rise occurs from early May to early July and a lesser rise from early November to early March. Downstream from Manaus the high-water period extends from early March to early September, with the maximum level occurring generally in June. At flood stage the drainage of the flood plain becomes chaotic. Once the floodwaters start to recede the temporary lakes along the abandoned channels are gradually reduced to marsh or meadowland, lesser connecting channels dry up, and sandy beaches reappear along the riverbanks and islands. A sufficient number of side and connecting channels, however, carry enough water during the dry season to permit relatively free movement by canoes and other small craft.

The flood plains of the tributary streams within the upper Amazon Basin are similar in general characteristics to the flood plain of the main river. Within the lower Amazon Basin, however, the lower reaches of many tributaries appear as broad estuaries or lakes.

b. Climate

The average annual rainfall ranges from 78 to 122 inches at the various stations in the subregion. In general, the greatest amount of rain falls during the summer (December through May) and the least during the winter (June through November). The duration and intensity of the dry season vary considerably in the subregion, ranging from a pronounced dry season in the vicinity of Óbidos and Santarém to only a "less rainy season" along the upper river.

Cumulus clouds predominate (see Figure 2); frequently they develop into towering cumulonimbus masses on summer afternoons. Fog is rare on the Amazon or its major tributaries; however, low stratus clouds or fog sometimes form over forested areas at about treetop level in the early morning.



Figure 1. Bluffs along margins of flood plain.

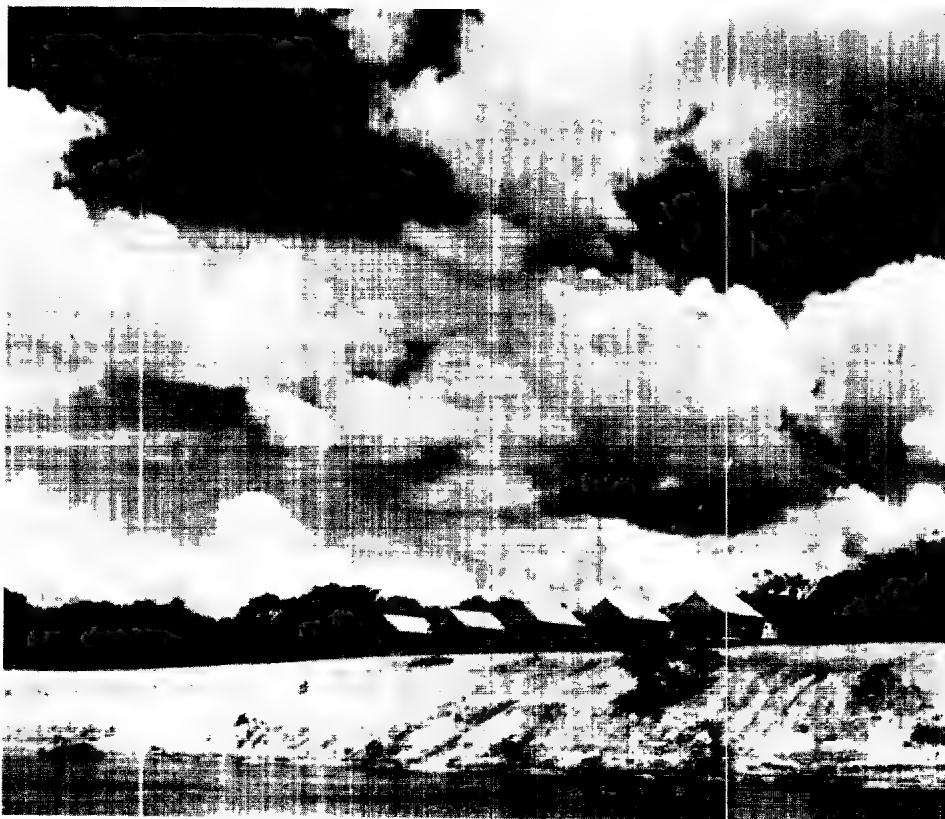


Figure 2. Cumulus clouds in Northern Region.

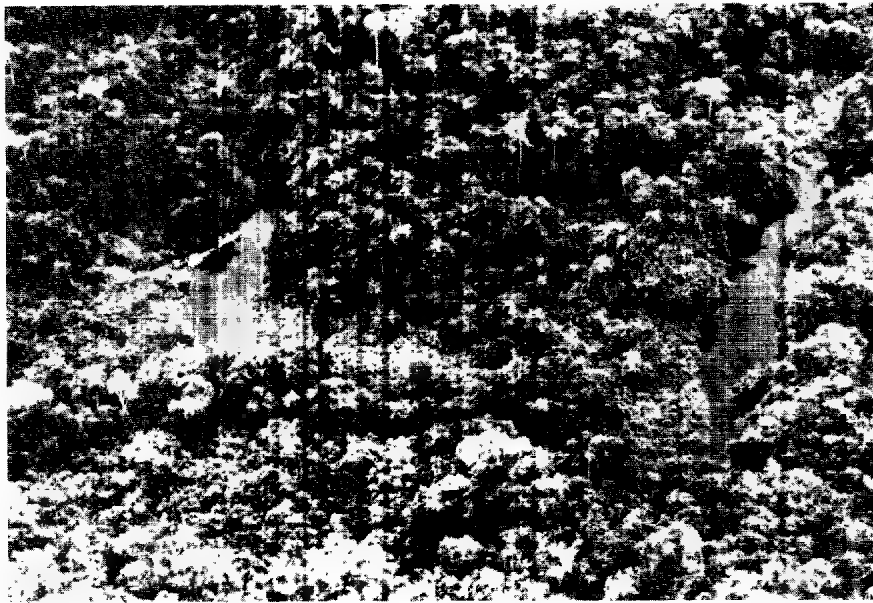


Figure 3. Tropical rain forest.



Figure 4. Amazon Flood Plain. Forests on the flood plain are inundated seasonally.

Calms prevail throughout the subregion in summer; they are interrupted only by the gusts of wind that accompany thundershowers. The trade wind penetrates the lower Amazon during the dry season and has a cooling effect there along the main river and its immediate margins.

The average annual temperatures within the subregion vary between 77°F and 82°F. Mean monthly temperatures are relatively constant throughout the year, the range between the warmest and coolest months being only about 4 Fahrenheit degrees. The daily temperature range is considerably greater than the annual range -- the average daily maximum and minimum being about 88°F and 73°F, respectively.

c. Vegetation

Tropical rain forest predominates on the Amazon Flood Plain (see Figure 3). This forest has a nearly closed canopy, 100 to 130 feet high. A few scattered giant trees rise above the main canopy, and smaller trees form two layers below. Saplings, bushes, and tall herbaceous plants comprise the undergrowth. Numerous ropelike lianas (climbing plants) are entwined in the trees, and long air roots hang from many of the epiphytes (air plants) perched on the larger branches or in the forks of trees. The lianas and air roots together form a tangled net. Vegetation is generally densest along the edges of clearings and along riverbanks. Most of the forests of the flood plain are inundated seasonally (see Figure 4); some stands on the lowlands of the Amazon Delta are flooded daily; and in some poorly drained areas where the ground never dries out a true swamp forest exists.

Seasonally flooded grasslands occur on some parts of the flood plain. Grasslands are most extensive on the eastern half of Ilha de Marajó and in the Lago Grande do Curuaí area. Mangrove swamps rim the small islands of the delta and the north and east coasts of Ilha de Marajó.

d. Land Use

Much of the flood plain is forested, and the collection of forest products during the dry season is an important economic activity. Jute and cacao are grown commercially, and a variety of subsistence crops are raised (see Figure 5). Livestock are grazed on the natural grasslands.

Wherever possible, habitations are built on natural levees or other areas of high ground that are inundated only during the highest floods. Many houses, however, are built on stilts on lower ground.



Figure 5. Amazon Flood Plain. Jute is the principal commercial crop.



Figure 6. Tropical rain forest. Dense vegetation impedes movement inland from the river margins.

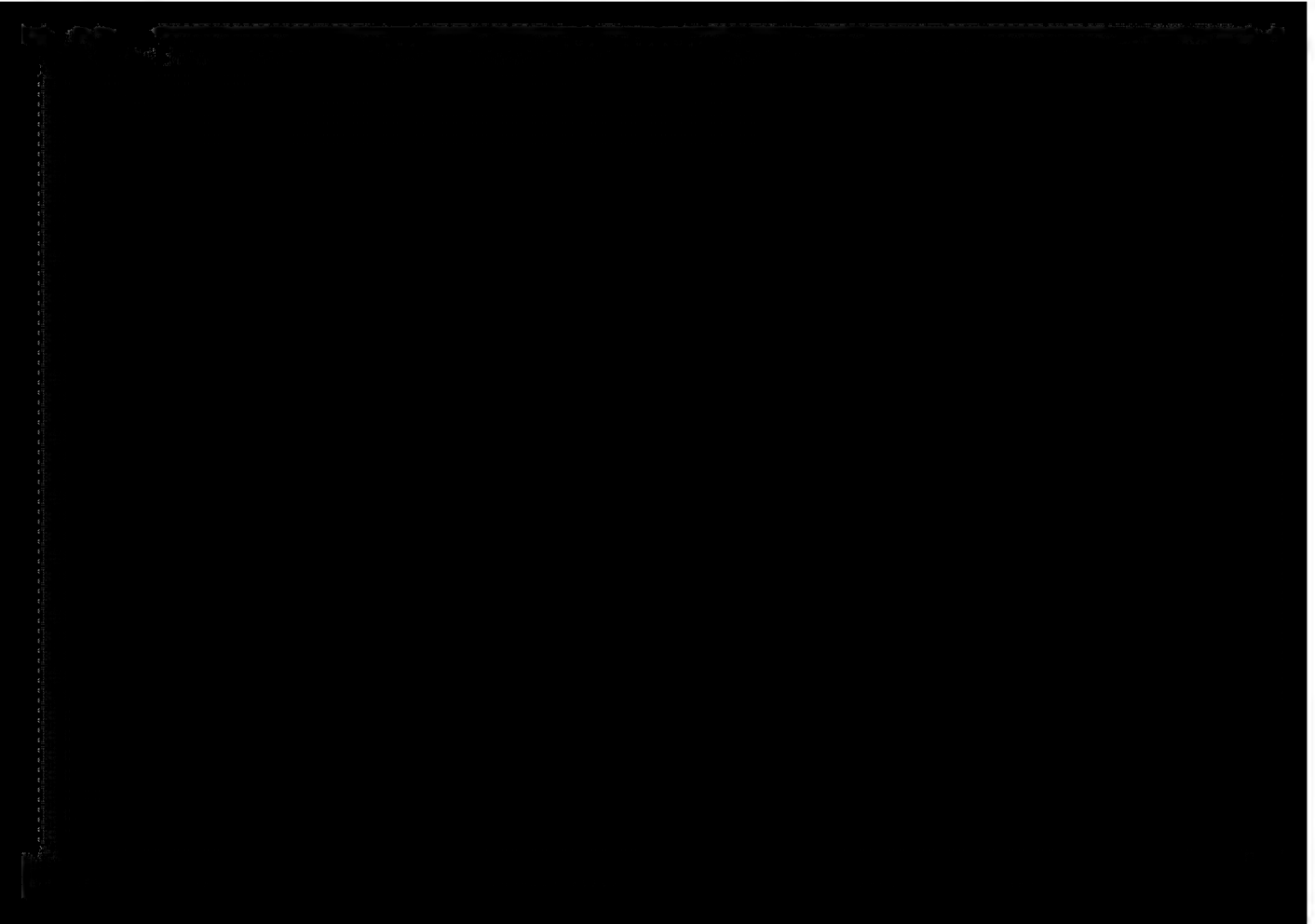


Figure 7. Riverine vegetation. Stands of aninga frequently form natural palisades along the river sides.



Figure 8. Side channel. The narrow watercourses paralleling the Amazon are used by the natives as canoe trails.

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3. Terra Firme

a. Terrain and Drainage

The terra firme includes the extensive area of higher ground in the Amazon Basin that spreads out to the north and to the south of the main flood plain. It is separated from the flood plain in most places by low bluffs, and it is divided into segments by valleys of the principal Amazon tributaries. The surface of the individual plateau segments is generally flat to rolling; however, scattered hills and mesas rise above the general surface level.

The segment adjacent to the Amazon Flood Plain is low and is commonly referred to as the Amazon Plain. It is relatively narrow along the lower Amazon, but widens in the upper basin to embrace most of the vast area between the Rio Madeira and Rio Negro. The segments of the terra firme situated to the north

and south of the Amazon Plain are higher and more rugged. Northward the land ranges from flat-to-rolling plains to rugged hills, mountains, and high tablelands (see Figure 9). Southward the terra firme is generally more tabular in configuration. The plateaus rise in successive steps southward toward massive tablelands situated along the southern border of the subregion. Fingerlike extensions of the high tablelands project northward into the subregion along either side of the Jurueña, Teles Pires, and Xingu rivers.

The seaward margin of the terra firme north of the Amazon Delta is bordered by a coastal plain made up of several broad terraces. The lowest terrace level is poorly drained and parts of it are inundated during the rainy season. The margin of the terra firme east of the delta is indented, consisting of small peninsulas separated by numerous small bays and inlets. In places a very narrow coastal plain backs the shore.

Many tributaries of the Amazon are themselves large rivers, having tributary streams of their own that exceed 500 feet in width for great distances. In addition, hundreds of smaller tributaries rise in areas remote from the principal rivers. Many streams overflow their banks during the height of the rainy season. The high-water level is reached at different times on various tributaries as well as along different sectors of some individual streams because of differences in the rainfall regime.

b. Climate

The climate of the terra firme is generally similar to that of the Amazon Flood Plain, although there is a wider range in the amount of rainfall and in the duration and intensity of the dry season. The average annual rainfall ranges from 56 to 139 inches. The greatest amount falls on the superhumid western part of the Amazon Plain, where there is no appreciable dry season. The least falls in the savanna areas along the southeastern and north-central peripheries of the subregion, which experience a pronounced winter dry season. The dry season extends from May through September (the Southern Hemisphere winter) in the area along the southeastern periphery and from October through April (the Northern Hemisphere winter) in the area along the north-central periphery.

Cumulus clouds are the characteristic cloudform of the subregion. During the rainy season they frequently develop into towering cumulonimbus clouds by noon or early afternoon, culminating in thunderstorms. Fog or low stratus clouds occasionally form over the forests at near treetop level in the early morning, but they usually lift and dissipate within an hour or two after sunrise.



Figure 9. Terra Firme. Near the Venezuelan border are high tablelands rimmed by cliffs.

Smoke from grass fires restricts visibility in parts of the subregion during the dry season. The fires occur over extensive areas of savanna and, locally, in clearings in the rain forest.

The northeasterly trade winds prevail throughout most of the subregion in summer, and the weak southeasterly trades prevail in winter. The trade winds seldom reach the upper Amazon, however, and the local winds there are generally light and variable. Strong surface winds are uncommon in the subregion, except for the gusty local winds that accompany thunderstorms.

The mean annual temperature averages about 77°F, and there is a difference of only about 5 Fahrenheit degrees between the coolest and warmest months. The temperature range between the warmest and coldest parts of the day is about 16 Fahrenheit degrees.

c. Vegetation

Tropical rain forest covers most of the subregion (see Figure 10). In structure the terra firme forest is similar to that of the Amazon Flood Plain. Three or four layers of trees can generally be distinguished, and the tops of individual layers are commonly somewhat higher than in the flood plain forest. The understory of saplings, bushes, and tall herbaceous plants is relatively open, but dangling roots and the stems of lianas and epiphytes form tangled nets between trees (see Figure 11). The vegetation is generally densest along the margins of clearings and along riverbanks. Various trees and plants are equipped with sharp spines or thorns that may tear clothing or lacerate the skin and cause infections.

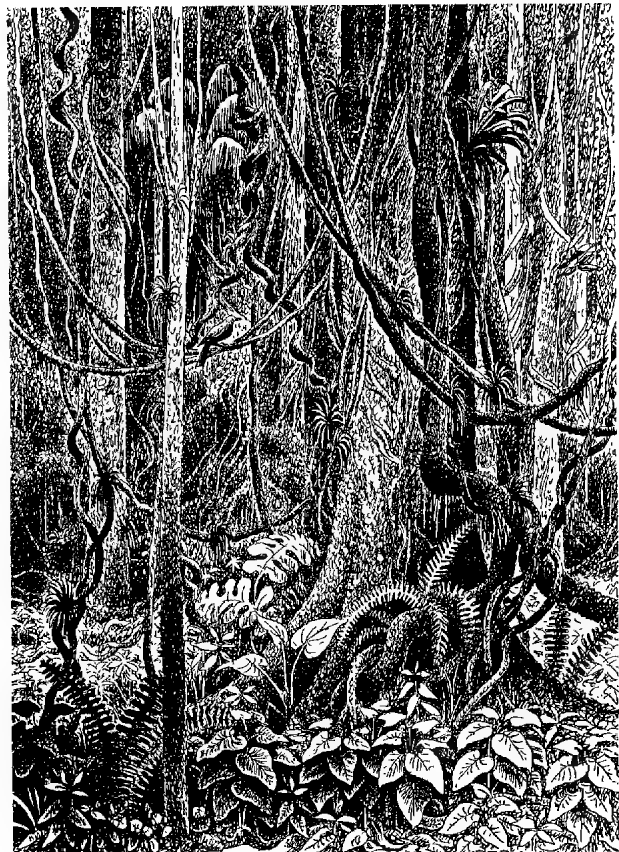
A woodland savanna occurs in those parts of the subregion having a pronounced dry season, as well as in some areas having porous sandy soils, such as on the tops of high tablelands. This vegetation is typically composed of grasses, shrubs, and low gnarled trees. The ratio of one to another varies greatly, ranging from grasslands with widely scattered shrubs and low trees to parklike stands of trees that form an open canopy above a grassy floor.

Areas of open grassland occur along the middle part of the Rio Branco Valley and on the Amapá coastal plain. Mangroves fringe the coasts of the subregion.



Figure 10. Tropical rain forest on Terra Firme. Brasília - Belém highway.

Figure 11. Tropical rain forest. Nets of lianas and air roots retard movement.



d. Land Use

The collection of forest products is the principal economic activity of the subregion, and the largest revenues come from the sale of rubber, Brazil nuts, and rosewood oil. Agriculture is confined primarily to small subsistence plots, although agricultural colonies have developed near the larger centers to supply the urban population (see Figure 12). Two commercial crops of increasing economic value are mallow (a fiber plant) and black pepper. Modern manganese mining operations are carried on in the Macapá area, and placer mining for gold and diamonds is common along streams in the territories of Roraima and Rondônia.

The gatherers of forest products live primarily in small villages or isolated huts along streambanks accessible by boat. The tribal Indians construct their primitive villages at some distance from the streams for protection from enemies who

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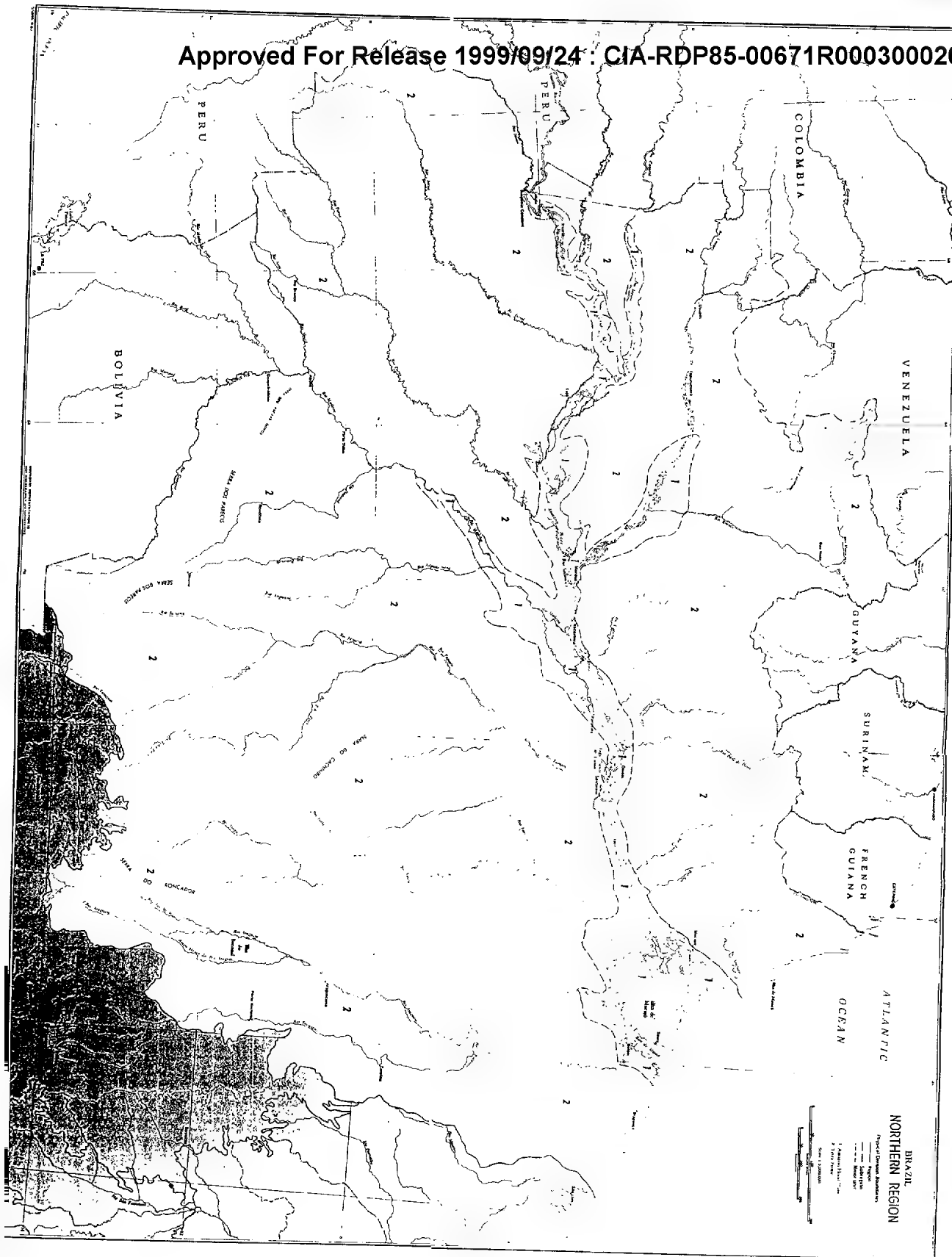


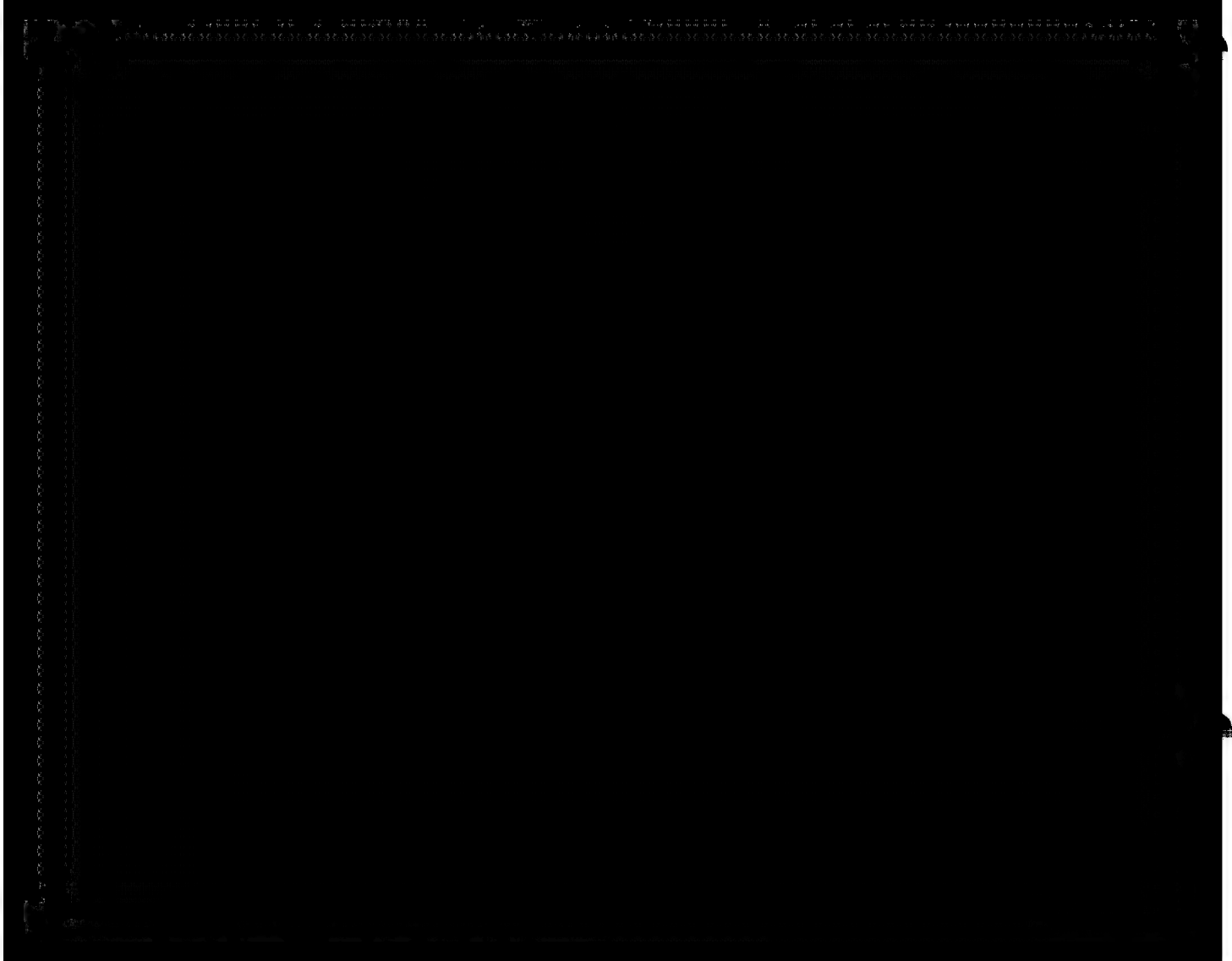


Figure 12. Subsistence farm in forest clearing.



Figure 13. Terra Firme. The various surface levels are generally separated by lines of low bluffs.

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C. West-Central Region

See Map 55898

1. General

The West-Central Region is an area of plains, plateaus, and hills. It includes the greater parts of the states of Goiás and Mato Grosso, the extreme western parts of Bahia and Minas Gerais, the southern tips of Maranhão and Piauí, and the Federal District (Brasília). The region has no sharply defined natural boundaries but includes the physiographic regions commonly referred to as the Central Plateau and the Pantanal.

2. Central Plateau

a. Terrain and Drainage

The term "Central Plateau" is used broadly to denote the series of high plateaus of interior Brazil that extend westward from the Sao Francisco Valley to the lowlands of the Paraguay River Basin (see Figure 14). The plateaus are contiguous, but their surfaces are at different elevations, and generally they are separated by escarpments. Some plateaus are known locally as chapadas. They are high, relatively flat tablelands, bordered by steep slopes or escarpments. Other plateaus appear as slightly tilted tablelands (cuestas), bordered by escarpments on at least one side. Frequently, parallel lines of cuestas rise steplike, one above the other, as platforms or broad terraces. The steep slopes that border the chapadas and cuestas often appear as low mountains when viewed from below, and locally they are referred to as serras (mountain ridges). Scattered hill groups and isolated hills rise above the general surface level of the chapadas and cuestas. In a few areas, particularly in the northeast, the plateaus have been dissected into complexes of sharp-crested hills of relatively uniform height.

Terrain units within the Central Plateau include the Brasilia Planalto and associated highlands, the Espigao Mestre, the Upper Araguaia and Tocantins Hill Zone, the Goias Depression, the Parana Plateaus, the Alcantilados and Furnas Plateaus, the Serra da Bodoquena, the Rio das Mortes Plateau, the Cuiaba Basin, and the Serra das Araras. The Brasilia Planalto and associated highlands, 3,000 to 4,600 feet in elevation, constitute the highest surface level. The Espigao Mestre adjoins the Brasilia Planalto to the northeast, forming the water divide between the Amazon and Sao Francisco river systems. The complex Upper Araguaia and Tocantins Hill Zone lies within the "L" between the Espigao Mestre and the Brasilia Planalto. Another hill zone, the Goias Depression, lies to the south of the Brasilia Planalto. To the west of the Goias Depression, at successively lower elevations, are the Parana, Alcantilados, and Furnas Plateaus, and the Serra da Bodoquena. To the north of the Alcantilados Plateau is the Rio das Mortes Plateau, overlooking the Amazon Basin, and to the west of the Rio das Mortes Plateau are the Serra das Araras and the Cuiaba Basin.

Streams within the Central Plateau generally are swift and are interrupted by numerous rapids along their upper reaches and by occasional rapids along their lower reaches. Although perennial along their lower courses, many streams carry little or no water in their upper reaches during the dry season. Most streams are confined by high banks and have no flood plains.

The Rio Paraná, the largest river, is bordered by a flood plain along much of its middle and lower course and overflows its banks during the high-water period. In general, stream levels start to rise with the onset of the rainy season, beginning in late September in the southern part of the subregion and between late October and early November in the northern part. The water level starts to drop as the rains taper off in April, but the low-water stage may not be reached until late June.

b. Climate

A tropical savanna climate with a summer rainy season and a winter dry season prevails over most of the subregion. The average annual rainfall ranges from 40 to 76 inches, with the greatest amount falling on the higher plateaus and the least on the Espigão Mestre and in the Paraná Basin. The rainy season extends from October through April for the subregion as a whole.

Cumulus clouds are the characteristic cloudform in the subregion (see Figure 15). They form during the morning and, during the rainy season, frequently build into cumulonimbus clouds by noon or early afternoon, culminating in thunderstorms. Low stratus clouds occasionally restrict visibility during the early morning. The incidence of fog is not great. Smoke from grass fires restricts visibility significantly during the latter part of the dry season.

Northerly surface winds prevail in most of the subregion during the summer, and southeasterly to northeasterly winds prevail during the winter. Strong surface winds are uncommon except for gusts that accompany thunderstorms.

The hot tropical climate is moderated locally by the effects of altitude. The mean annual temperature varies between 68°F and 78°F. Mean daily maximum temperatures range from 84°F to 97°F in September, the hottest month, and mean daily minimum temperatures range from 48°F to 68°F in June and July, the coldest months. The daily temperature range extends from a minimum of about 25 Fahrenheit degrees to a maximum of nearly 43 Fahrenheit degrees. Within the highlands, nighttime temperatures in the narrow valleys drop significantly below those on the adjacent plateau.

c. Vegetation

The natural vegetation ranges from grassland through open woodland savanna to dense tropical semideciduous forest. The grasslands and woodland savanna are generally associated with

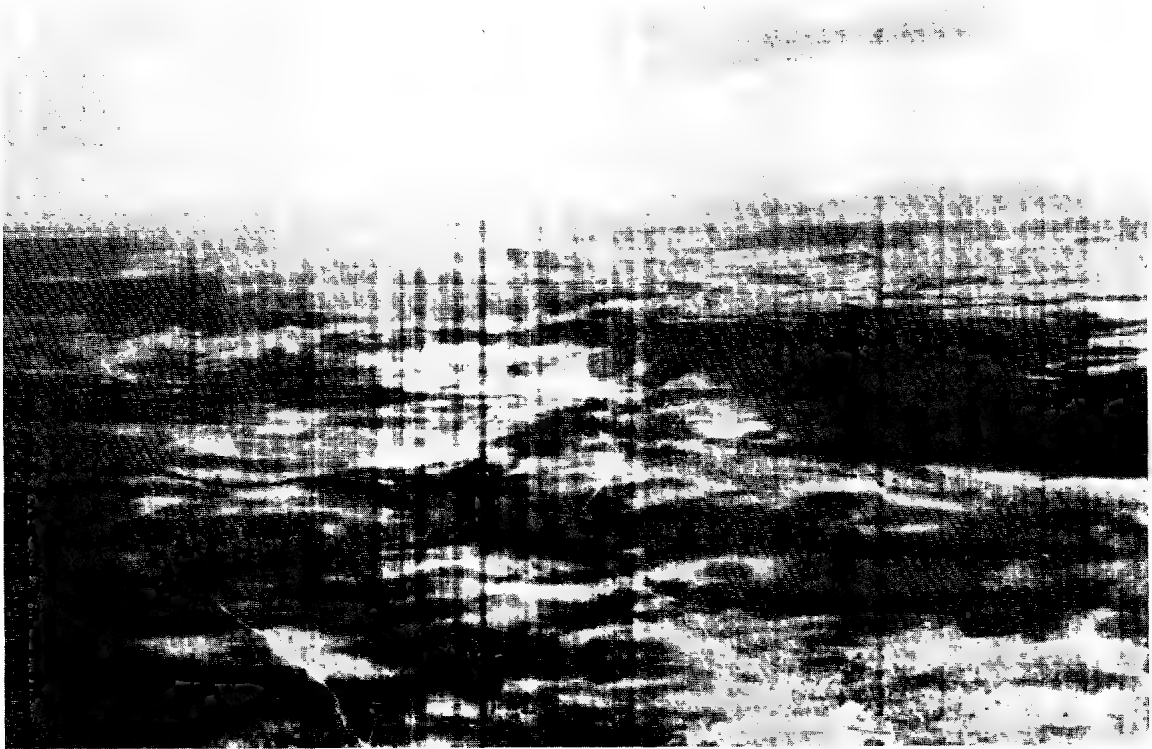


Figure 14. High Brasília Planalto. The surface is flat to undulating.



Figure 15. Cumulus clouds over Central Plateau.

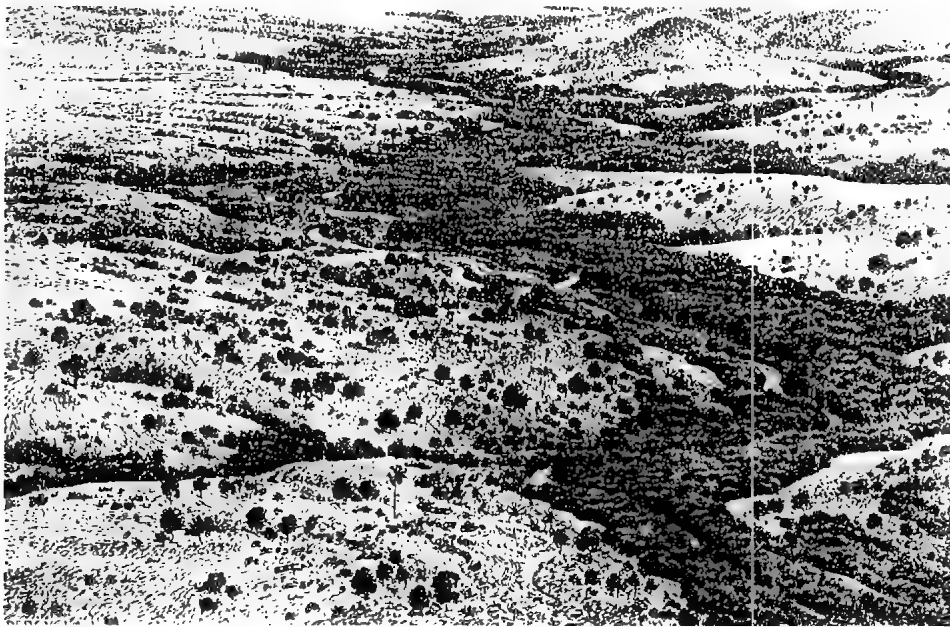


Figure 16. Tropical semideciduous forest. Bands of forest extend along the principal stream valleys.



Figure 17. Vegetation on Central Plateau. Woodland savanna, composed of grasses, shrubs, and low gnarled trees, predominates.

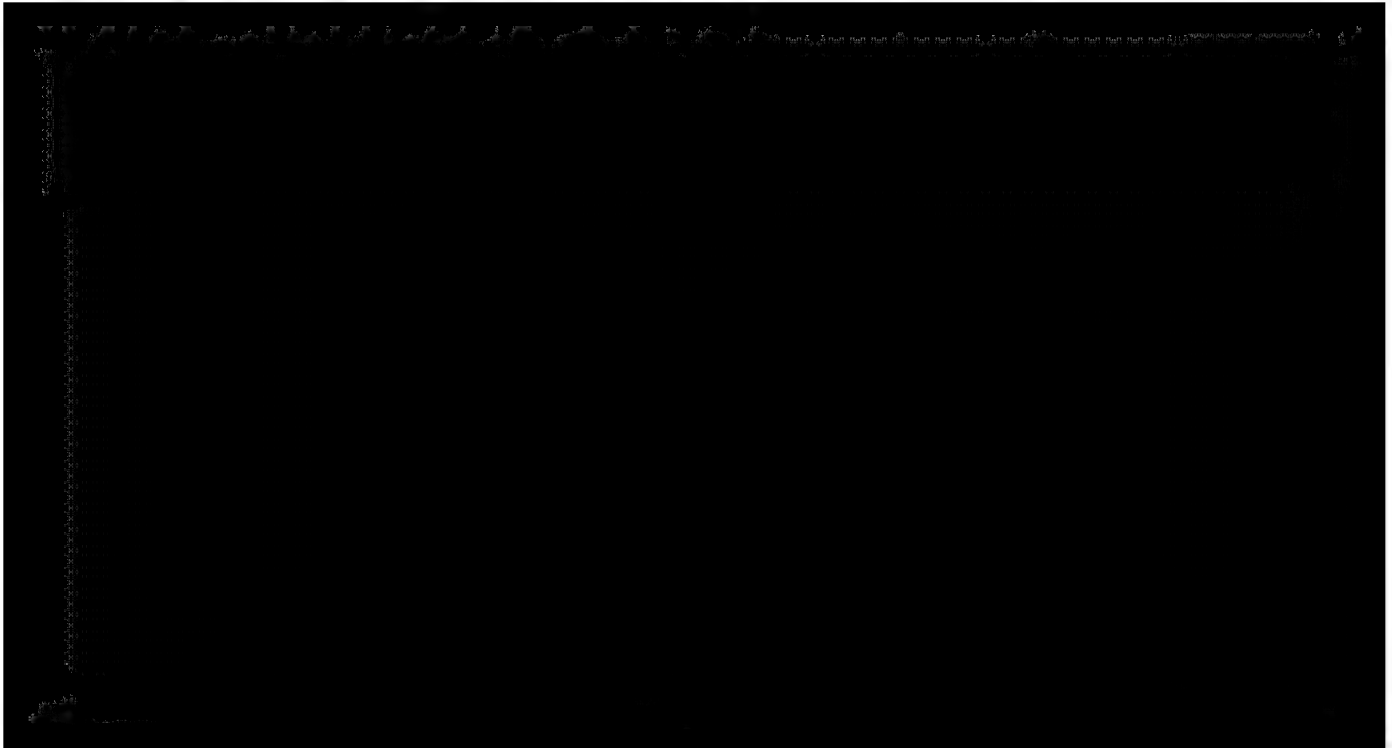
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the flat surfaces on the plateaus and cuestras, and the forests occur more commonly on slopes and along stream valleys (see Figure 16). Woodland savanna, composed of grasses, shrubs, and low gnarled trees, is the predominant form of vegetation (see Figure 17). It varies in structure from grasslands with widely scattered shrubs and low trees, through parklike stands of low trees with open canopy and a grassy floor, to scrub woodland. The tropical semideciduous forest stands are usually stratified into three layers, but they are not uniform in structure. From 10 to 30 percent of the trees shed their leaves during the dry season. The undergrowth tends to be more dense in these stands than in the tropical rain forest. Lianas and epiphytes are present, their number varying considerably with local conditions.

d. Land Use

The herding of range cattle is the principal economic activity in the Central Plateau. Subsistence agriculture, based on the slash-and-burn method, is carried on in scattered areas -- primarily along river valleys and on cutover forest land. Small-scale commercial agriculture is practiced in a few areas, such as the Triângulo Mineiro, the Mato Grosso do Goiás, and parts of the Paraná Basin. Significant commercial crops are rice, coffee, cotton, wheat, and sugarcane. In addition, some mining of diamonds, quartz crystals, and nickel

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Figure 18. Central Plateau. Locally, movement is somewhat restricted by steep slopes.



Figure 19. Woodland savanna. Movement is relatively free on foot or on horseback.

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Figure 20. Tropical semideciduous forest. The dense undergrowth retards movement across country.

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3. The Pantanal

a. Terrain and Drainage

The Pantanal is an extensive lowland area that extends along the Paraguay River and its tributaries. The flat to undulating surface rises gradually eastward, away from the river. Much of the lowland near the river is inundated during the rainy season and is marshy at other times. Eastward, the surface has a swell and swale appearance, with numerous shallow depressions separated by stretches of slightly higher ground situated above flood level. A belt of low, rolling foothills extends along the outer margin of the Pantanal, near the base of the bordering escarpments. Scattered hill masses and steep mesas occur along the western side of the Paraguay River near the Bolivian border.

Streams within the Pantanal are characteristically wide and sluggish. The winding Paraguay River is dotted with numerous small islands. Its banks rise above the general flood level, but those of the tributaries flowing through the marshland near the main river are very low and are almost indistinguishable locally. Numerous short, shallow watercourses interconnect the many depressions and the main stream network. Many minor streams dry up during the dry season. Even large rivers such as the Rio Negro reportedly dry up during particularly long and intense dry seasons. Some of the depressions contain lakes or ponds throughout the year; others are reduced to marshes or dry up completely during the dry season.

The Paraguay River begins to rise in January and good navigable stages prevail from February to September. The depressions and extensive flood plains are generally inundated from December to May. Ponds and lakes either expand greatly in size, individually, or coalesce to form extensive bodies of

water. The inundated flood plains of the Paraguay River and its east-bank tributaries frequently form a continuous sheet of water as much as 15 miles wide and 13 feet deep in places. The water level remains high on the principal streams after the rainy season ends until the excess surface water on the lowlands has gradually drained off into the streams.

b. Climate

The Pantanal has a tropical savanna climate, similar in most respects to that of the Central Plateau. The average annual rainfall is somewhat lower in the Pantanal, ranging from about 40 to 50 inches, and the temperature readings are somewhat higher. The mean annual temperature ranges from about 73°F to 78°F, and the mean daily maximum temperatures for the hottest months range from 89°F to 93°F at selected stations.

c. Vegetation

Grasslands predominate in the Pantanal but alternate with woodland savanna and forests. Grassland and woodland savanna spread out over the extensive lowland area and are subject in varying degrees to alternate inundation and drought. Bands of tropical semideciduous forest grow on the natural levees along the principal streams and on stretches of higher ground that rise slightly above the normal flood level. A distinctive Chaco type of drought-resistant vegetation, including many spiny plants, occurs on dry lowlands along the east side of the Paraguay River southward from Pôrto Esperança and on the dry slopes of scattered limestone hills along the west side of the river. It varies from open stands to dense thorny thickets.

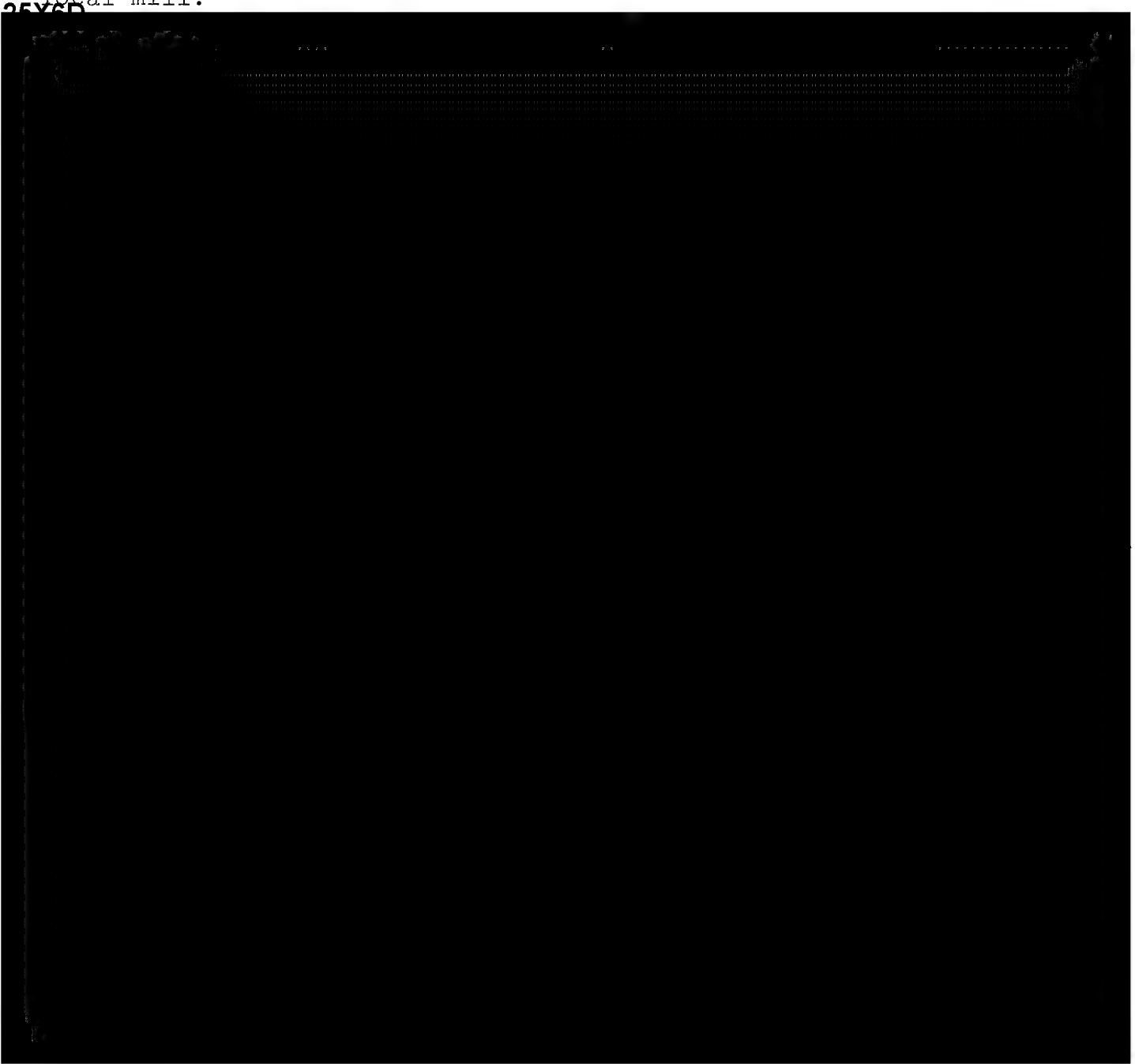
Tall sedges, some having sharp edges that cut like Florida sawgrass, grow in the permanently moist swales and marshes. Dense stands of reeds 8 to 10 feet tall cover the lowest wet spots, and floating mats of aquatic plants grow on the surfaces of shallow lakes and on quiet lagoons along the main rivers. When the waters recede at the end of the high-water period the floating islands move out toward the main channels and often solidly choke the side channels.

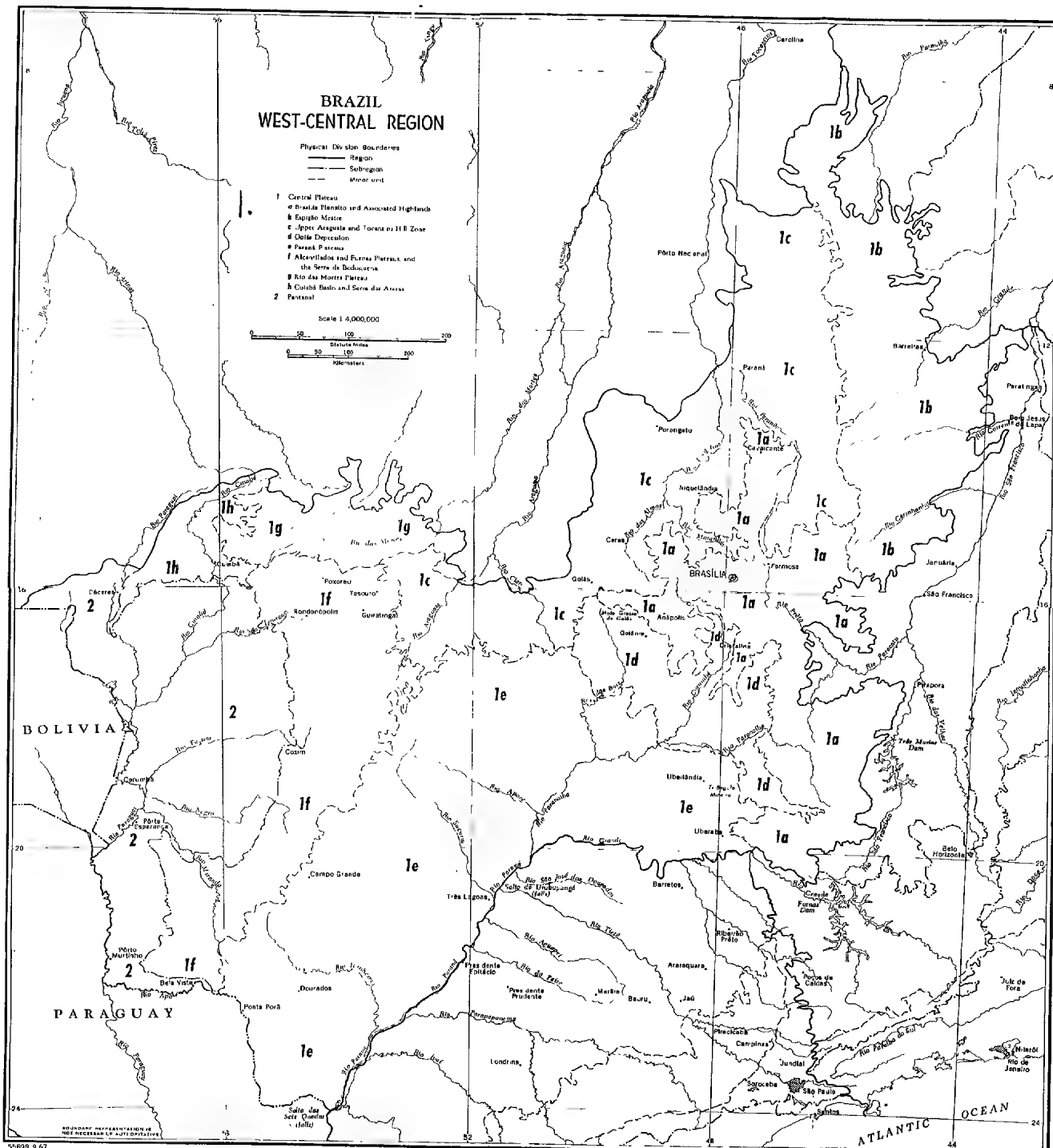
d. Land Use

Cattle raising is the principal economic activity in the Pantanal. During the dry season cattle graze on grassy lowlands throughout the area. During the rainy season many are driven to poor pastures on higher ground or to fattening pastures far away in the western parts of the states of Minas Gerais

and São Paulo. Some cattle are marketed or processed locally.

Manganese and iron are extracted from the Urucum mines south of Corumbá. Most of the ore is produced for a small local mill.





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Figure 21. The Pantanal. Buriti palms encircle waterholes on the elevated eastern part of the sub-region.



Figure 22. Zona da Mata. Sand dunes border a lagoon on the coastal plain.

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D. Northeastern Region

See Map 55896

1. General

The Northeast is an amorphous region with boundaries variously defined to suit different frames of reference. In this handbook the Northeastern Region is delimited primarily in terms of terrain, climate, and vegetation and includes not only the six states of the traditional Northeast -- Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, and Sergipe -- but also the state of Piauí and parts of Bahia and Maranhão. Three low mountain ranges and a dissected high plateau form the skeletal framework of the region. The mountain ranges project northward, eastward, and southwestward from the Chapada do Araripe like the spokes of a wheel, forming water divides between extensive areas of plains and low plateaus. The Serra da Ibiapaba forms the northern spoke, the Serra dos Cariris Velhos the eastern spoke, and a series of ranges including the Serra da Farinha and Serra Tabatinga the southwestern spoke. The high Borborema Plateau lies at the eastern end of the Serra dos Cariris Velhos and constitutes the dominant terrain feature in the eastern part of the region north of the São Francisco Valley. The climate varies considerably within the region, primarily in amount of rainfall. Variations in natural vegetation and land use are closely related to the rainfall regime. As a result, the subregions within the Northeastern Region correspond more closely to climatic zones than to terrain regions. The Zona da Mata is a humid area along the east coast; the Sertão includes the extensive semiarid interior of the region; the Agreste is a transitional area between the Zona da Mata and the Sertão; and the Parnaíba-Mearim Subregion is a transitional area between the Sertão and the humid Amazon Basin.

2. Zona da Mata

a. Terrain and Drainage

The Zona da Mata, extending along the humid east coast of the region, is 25 to 60 miles wide. It includes three distinctive belts -- the narrow coastal plain, the low sandy tablelands (tabuleiros), and the crystalline hills.

The sandy coastal plain, seldom exceeding 5 miles in width, extends inland to the steep margin of the coastal tablelands. The shore is generally low and sandy, and the beaches are backed in most places by a belt of sand dunes or raised beaches (see Figure 22).

The coastal tablelands range from approximately 5 to 30 miles in width. Their seaward margins are marked by discontinuous low cliffs. Streams flowing eastward across the zone have cut steep-sided valleys that divide the surface into parallel blocks -- whence the name tabuleiros.

The belt of crystalline hills, west of the tabuleiros, corresponds in general to the sugarcane area and is the most densely populated and economically productive part of the Northeast. The rolling hills increase in height and degree of slope inland (see Figure 23). The area is drained by a few main rivers and a maze of small tributary streams. Meadows and flood plains extend along most of the main valleys, and discontinuous narrow ribbons of flood plain extend along many of the minor valleys.

The principal streams are perennial, but some minor streams may dry up completely during the dry season. The period of high water on the main rivers extends from April through September. The mouths of many of the main streams are drowned, forming small bays. Drowned side valleys or channels branch off some of the bays and reach into the adjacent coastal plain, forming lagoons and swamps. The Rio São Francisco flows across the Northeastern Region. Its lower course is sluggish and interrupted by sandbars and mudflats, and an extensive delta has formed at its mouth.

b. Climate

A tropical humid climate prevails in the Zona da Mata. The mean annual rainfall exceeds 40 inches throughout the zone and probably exceeds 80 inches in the more humid part of southeastern Pernambuco. Throughout most of the zone the rainy season occurs during autumn and winter (March through August), and the dry season extends from September through January. The amount of rainfall received diminishes from the coast inland until high hills are reached and then increases on the windward slopes.

Low ceilings and poor visibility occur in winter in association with frontal activity. The occurrence of dense mist or fog is minimal along the coast but increases inland as elevation increases.

The discomforting effects of high humidity and temperature are alleviated somewhat by the persistent trade winds and the land and sea breezes, although the latter are relatively weak.

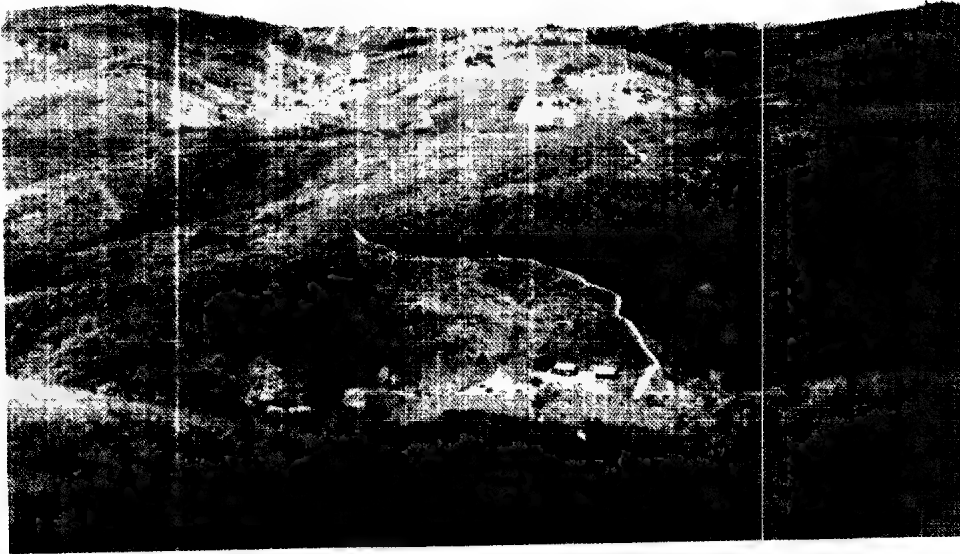


Figure 23. Crystalline hills. The hill belt is widest and most dissected in southeastern Pernambuco.



Figure 24. Land use in the Zona da Mata. Cane fields generally cover the gentle slopes of the crystalline hills, and forest remnants occupy the hilltops and steep slopes.

Temperatures are high and fairly uniform throughout the year. The mean annual temperature ranges from 77°F at Salvador to 79°F at Natal. The mean daily maximum temperature for the warmest month ranges from 86°F to 88°F, and the mean daily minimum for the coldest month ranges from 68°F to 71°F.

c. Vegetation

The natural vegetation of the Zona da Mata varies considerably. The coastal mixture includes sparse beach and sand dune vegetation, coconut groves, mangrove swamps, occasional stands of cashew, and scrubby second-growth forest. In the coastal tableland zone woodland savanna generally covers the level areas on the tops of the tabuleiros, and second-growth forest grows on the slopes. The woodland savanna varies from open grassland with scattered scrawny low trees and shrubs through parklike stands of low trees with open canopy and grassy floor to tall scrub woodland. The second-growth forest consists of a scrubby growth of young slender trees and a dense underbrush. The stands include some semideciduous species that lose their leaves briefly during the dry season. Lianas and epiphytes are present. Most of the land in the zone of crystalline hills is under cultivation, and the natural vegetation is reduced to scattered remnants of tropical forest, mostly second growth, on steep slopes and hilltops (see Figure 24). These forest remnants are generally more dense than the second-growth forest on the tabuleiros and contain more lianas, epiphytes, and ferns. The trees are mostly broadleaf evergreens.

d. Land Use

Coconut groves extend along the low marine terraces and beaches of the Zona da Mata. Numerous fishermen live along the shore -- some in thatched huts scattered among the palms and others in fishing villages. On the sandy coastal plain, scattered subsistence farms are interspersed among areas of low scrub growth. On the tabuleiros the principal activities are lumbering, firewood cutting, and charcoal burning in the wooded areas and open range cattle raising in the woodland savanna. The few scattered habitations of the tabuleiros are generally located along the roads or in small valleys. In the zone of crystalline hills, growing sugarcane is virtually the only economic activity (see Figure 25). Fields of sugarcane cover the flood plains and, in some areas, the adjacent hill-sides. Houses and small garden plots associated with them are
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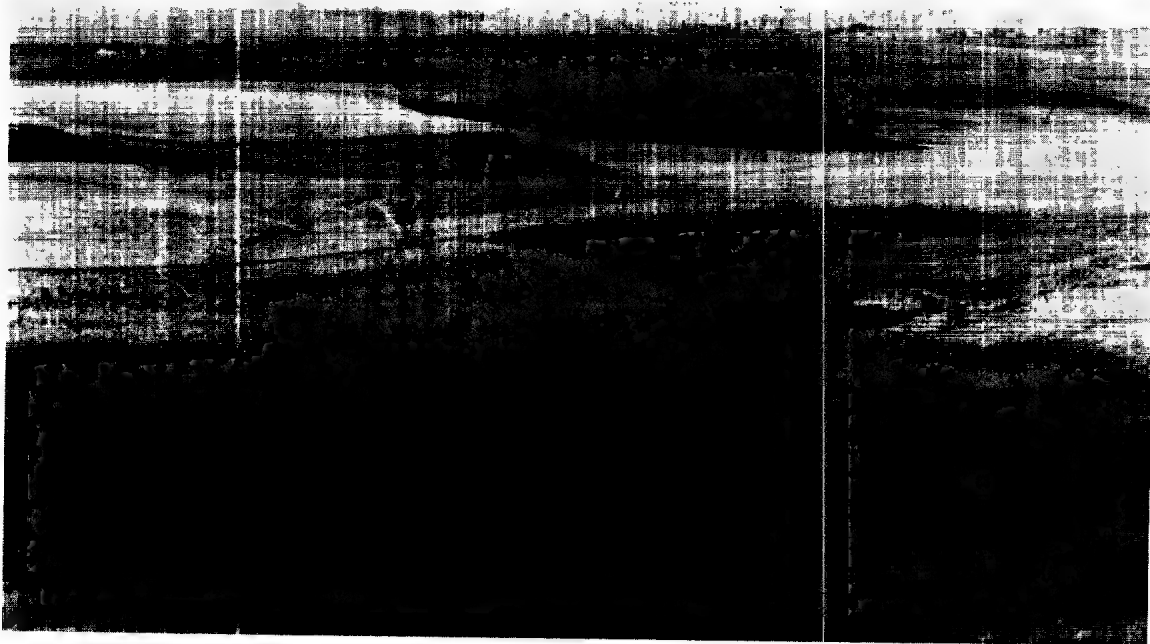
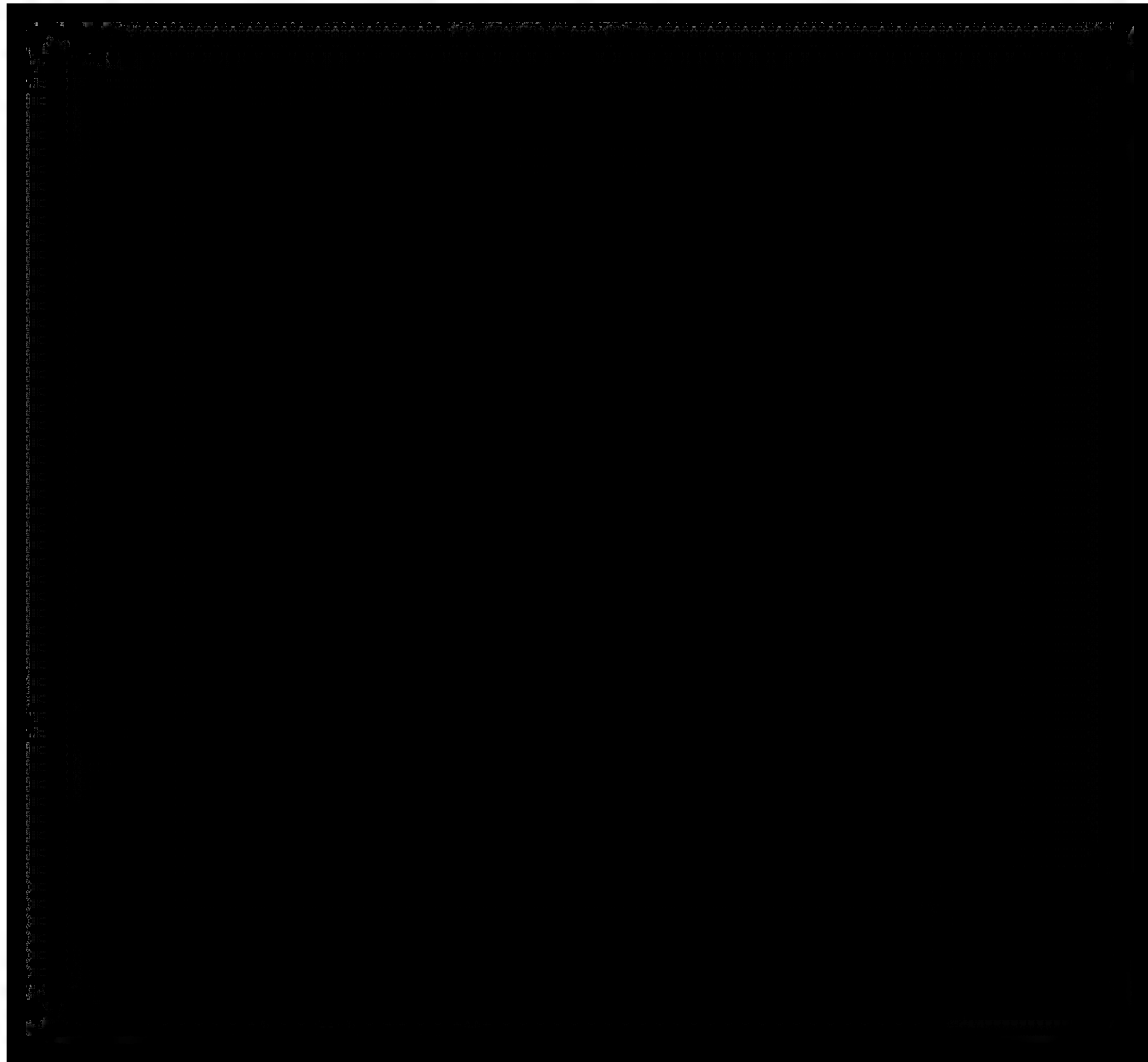


Figure 25. Vast sugarcane fields in Zona da Mata.

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3. The Agreste

a. Terrain and Drainage

The Agreste is a transitional area lying between the humid Zona da Mata and the semiarid interior (the Sertão). This relatively small subregion consists of two areas separated by a semiarid corridor along the lower São Francisco Basin.

The northern Agreste area is an elongated belt, 15 to 100 miles wide, extending from the northeastern tip of Rio Grande do Norte south-southwestward to the São Francisco Valley. It extends along a segment of the coast of Rio Grande do Norte and continues southward along the Borborema Plateau. A line of rugged heights, rising above the flat-to-rolling surface of the Borborema Plateau, forms the western border. The abrupt eastern edge of the plateau has been deeply dissected, forming a ridge-and-valley landscape (see Figure 26).

The southern Agreste is located in Bahia. It is a U-shaped area with its base coinciding roughly with the Paraguaçu Valley, its eastern arm extending along the inner margin of the Zona da Mata and its western arm stretching along the eastern margin of the Chapada Diamantina. The eastern arm consists primarily of low sandy plateaus similar to the coastal tabuleiros. The western arm includes part of the steep eastern slope of the Chapada Diamantina and an adjacent zone of rugged hill masses separated by relatively broad low-land corridors. The hills have been dissected by innumerable small streams whose narrow, irregularly oriented valleys form a chaotic drainage pattern.

With few exceptions the streams in the Agreste are intermittent. Most of the larger rivers carry water throughout the rainy season but dry up for at least a short period during the latter part of the dry season. Many of the minor streams flow only for brief periods after rainstorms. A few that have their sources on the higher hills carry water most of the year. The Rio Paraguaçu is perennial except along its extreme upper reaches.

b. Climate

In general, the climate of the Agreste is similar to that of the Zona da Mata, but it differs significantly in terms of amount and regularity of rainfall. The average annual rainfall is less than 40 inches throughout the subregion, with as little as 25 inches in parts of the northern Agreste. Violent deviations from the norm occur from year to year. In most of the subregion the rainy season occurs during the autumn and winter (March through August). In the southern Agreste, however, there is a gradual transition from an autumn-winter rainfall pattern in the eastern part, through a summer rainfall regime in the central part, to a regime with no marked dry season in the zone along the eastern slopes of the Chapada Diamantina.

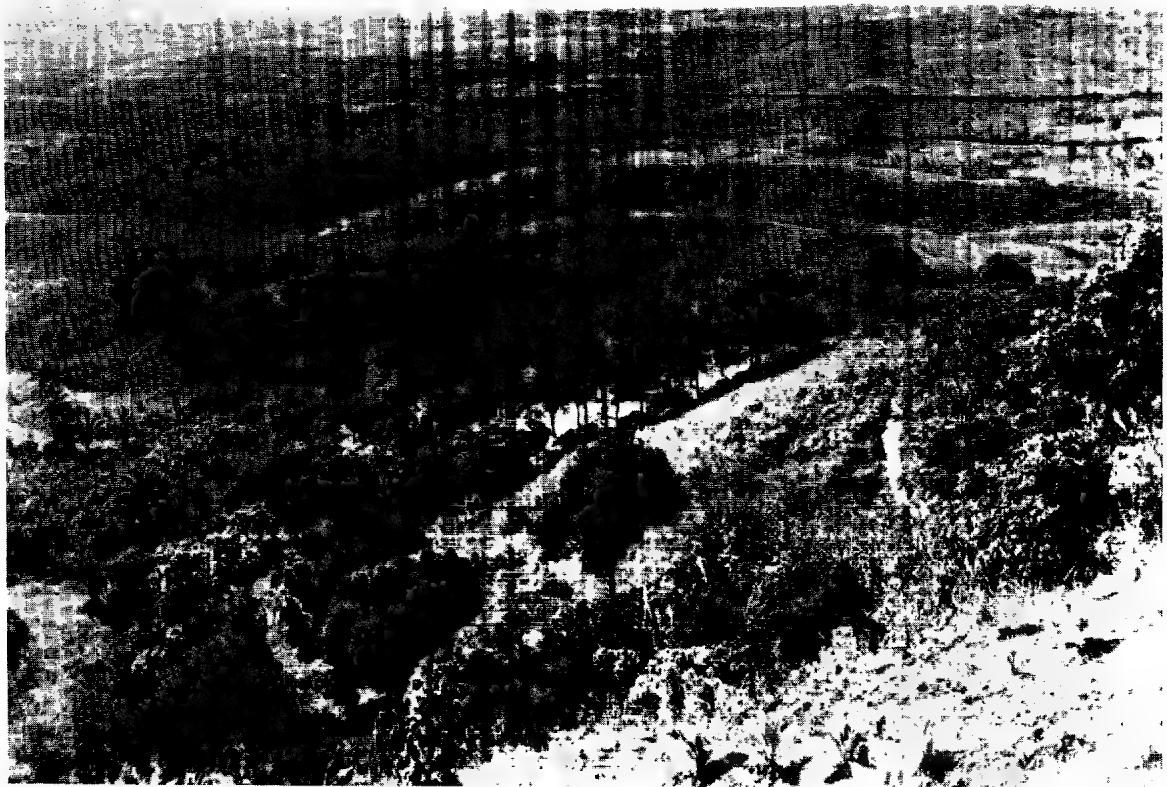


Figure 26. Hilly terrain in Agreste area of northern Paraíba.

c. Vegetation

Most of the original agreste vegetation has been cut and replaced by cultivated fields on the arable land and by dry scrub vegetation in areas that are either too steep for cultivation or have unsuitable soils. The dry scrub ranges from high thorn forest to low thorny scrub. The trees of the thorn forest are only 25 to 30 feet in height, and many lose their leaves during the dry season. A dense undergrowth, including thorny species and cactuses, covers the ground beneath the trees. These stands are frequently separated by grassy areas. Low thorny scrub grows in the driest locations. It is bushy and more open than the thorn forest. Small tracts of second-growth tropical forest occur on some of the humid heights, and limited areas of woodland savanna occur on the sandy tabuleiros in Bahia.

d. Land Use

The diversified agricultural land use of the Agreste contrasts sharply with the virtual monoculture of sugarcane in the adjacent Zona da Mata and of open range cattle raising in the Sertão. Small farms predominate, and subsistence farming is generally combined with the cultivation of one or more commercial crops and open range cattle raising (see Figures 27 and 28). Range cattle are generally grazed on the poorer land where the low thorny scrub or woodland savanna vegetation is interspersed with natural grassland. The most important commercial crops in the northern Agreste are cotton and sisal (see Figure 29). Specialty crops such as tomatoes and various fruits are grown in a few favored "oases." In the southern Agreste tobacco and manioc are the most important crops, and beef cattle are raised on improved pastures. Some lumbering occurs on the humid slope of the Chapada Diamantina.

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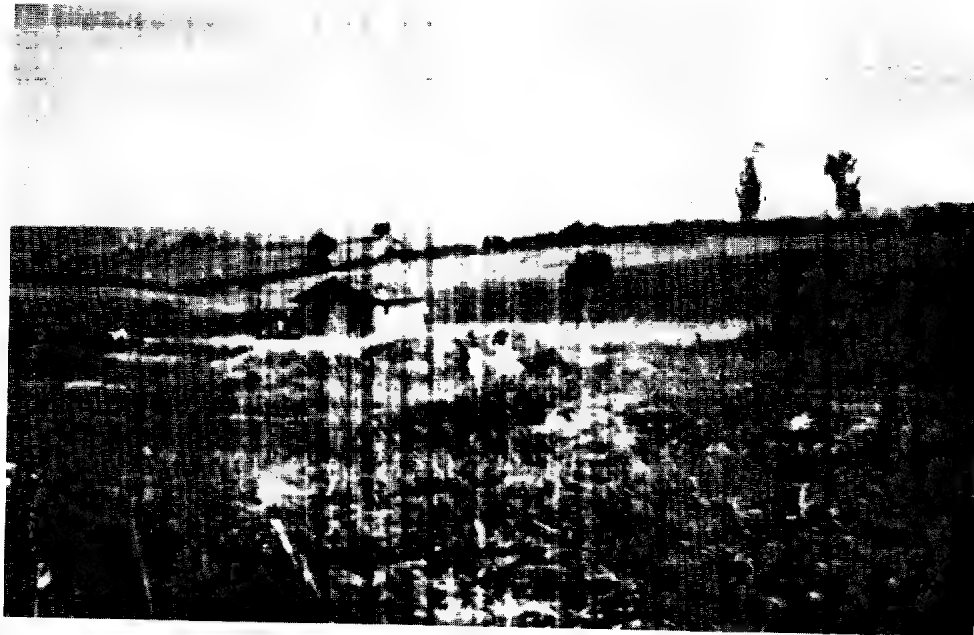


Figure 27. Small farm in the Agreste. Hedgerows separate landholdings.



Figure 28. Palma. This is a species of spineless cactus grown as a forage crop in the Agreste and the Sertão.



Figure 29. Sisal field in the Agreste.

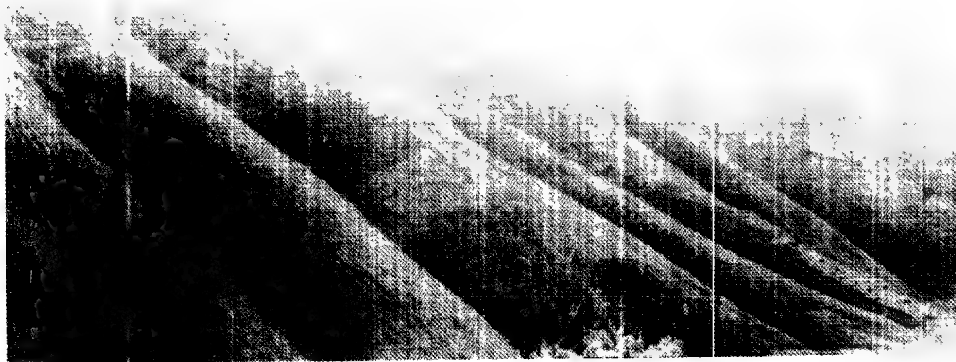


Figure 30. Steep slopes along northern margin of Chapada do Araripe.



4. The Sertão

a. Terrain and Drainage

The semiarid Sertão constitutes the largest part of the Northeastern Region. Irregular chains of low mountains, tablelands, and rugged hills radiate from a central tableland and separate broad areas of plains, basins, and low plateaus into a series of compartments. This overall radial pattern is distorted by the basin of the Rio São Francisco, which forms a giant loop across the southern part of the subregion.

The Chapada do Araripe, about 2,500 feet in elevation, is the central tableland (see Figure 30). The Serra da Ibiapaba extends northward from the western end of the Chapada do Araripe to within 25 miles of the north coast (see Figure 31). The Serra dos Cariris Velhos reaches eastward from the Chapada do Araripe to the arid western part of the Borborema Plateau (see Figure 32). Lesser chains of low mountains and hills extend northward and northeastward from the Chapada do Araripe into the broad area between the Serra da Ibiapaba and the Serra dos Cariris Velhos. Interior basins are enclosed between these lesser chains and the main mountain ranges. A zone of lowlands and low plateaus extends along the north coast and penetrates varying distances inland between the several mountain and hill ranges.

To the south of the Borborema Plateau and the Chapada do Araripe is the vast southern Sertão. It includes much of the

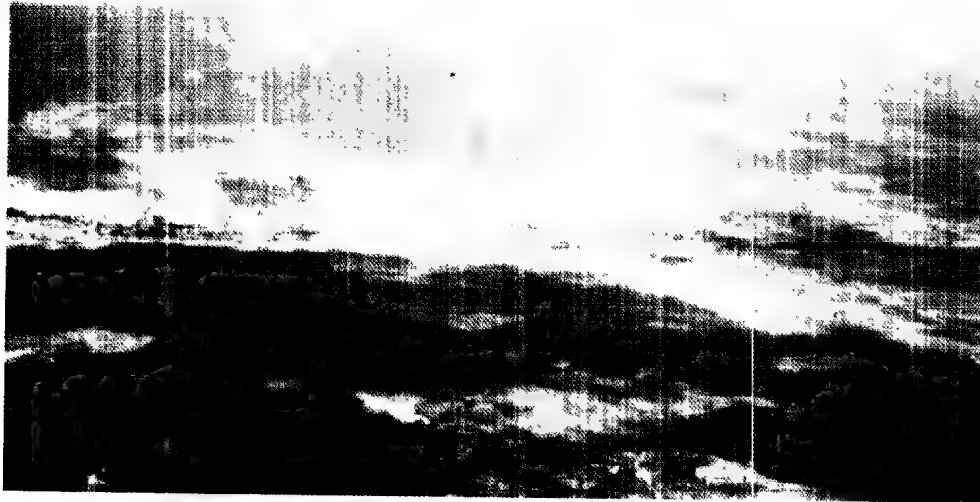


Figure 31. Serra da Ibiapaba. A high escarpment marks the eastern edge.



Figure 32. Rugged terrain along northwestern part of Borborema Plateau.

lower and middle São Francisco River Basin, the Chapada Diamantina, and an area of hills and low tablelands to the east of the Chapada Diamantina exclusive of the Agreste (see Figures 33 and 34).

An irregular chain of hills and low mountains, including the Serra da Farinha and Serra Tabatinga, extends southwestward from the Chapada do Araripe and separates the southern Sertão from the western Sertão. The latter includes the semiarid part of the upper Rio Parnaíba Basin.

Most of the streams that drain the Sertão are intermittent and may be dry 5 to 9 months a year. The secondary streams, in particular, have a torrential regime, and flash floods are common (see Figure 35). Most rivers and streams are subject to floods at the onset of the rainy season. Despite these floods, the average volume of flow is relatively small during the early part of the season, increasing gradually as the season progresses. In the northern Sertão the high-water level is reached in March and sustained until May (see Figure 36). In the southern Sertão the maximum level is reached earlier -- late December or early January -- and lasts until March or April. Within a month after the onset of the dry season the streams are usually either dry or reduced to stagnant pools of water occupying depressions along the streambeds. The Rio São Francisco, the Rio Grande, and the Rio Itapicuru are perennial streams atypical of the Sertão as a whole.

Dams have been constructed on many streams of the Sertão to store water for use during the dry season. The dams and associated reservoirs vary greatly in size, and many smaller reservoirs dry up during the latter part of the dry season (see Figure 37).

b. Climate

The climate of the semiarid Sertão is characterized by a short rainy season, a long dry season, and great irregularity in rainfall from month to month and from year to year.

In general, the average annual rainfall ranges between 15 and 30 inches; however, higher amounts are received on mountain slopes exposed to moisture-bearing winds and along the lowlands of northern Ceará, and lower amounts are received on the western part of the Borborema Plateau and in parts of the lower São Francisco Valley. The rainy season occurs in summer (November to April) in most of the area south of the Chapada do Araripe and in summer and autumn (January to June) in the northern Sertão (see Figure 38).

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Figure 33. Southern Sertão. Hills rise above the general surface level to elevations of 2,000 or 3,000 feet.

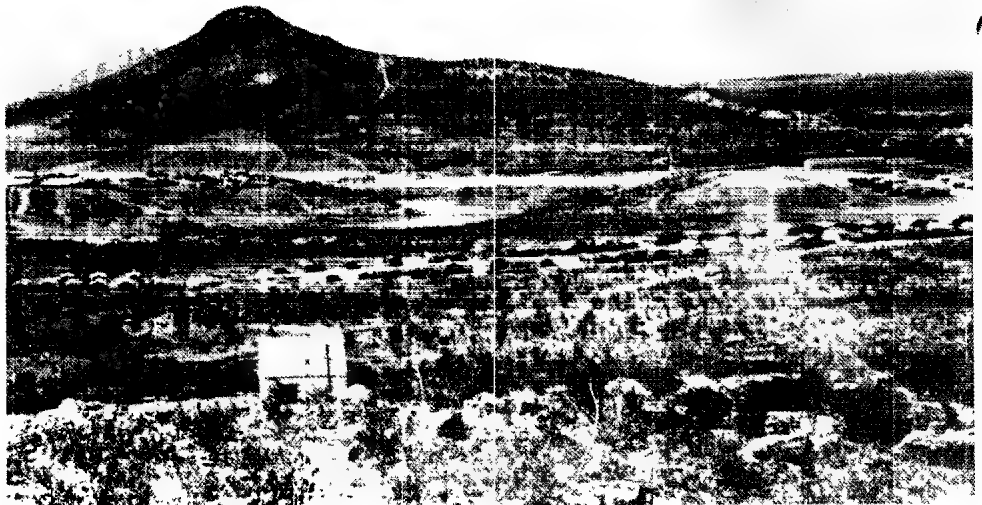


Figure 34. São Francisco Valley. The river is deeply entrenched downstream from the falls of Paulo Afonso.

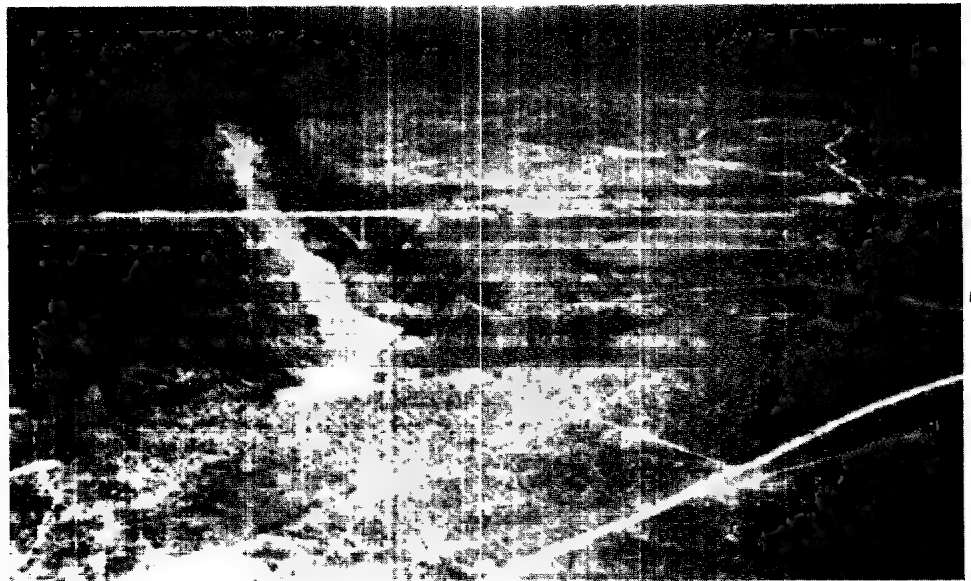


Figure 35. The Sertão. Flash floods are common.



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Figure 36. High-water level on stream in northern Sertão.

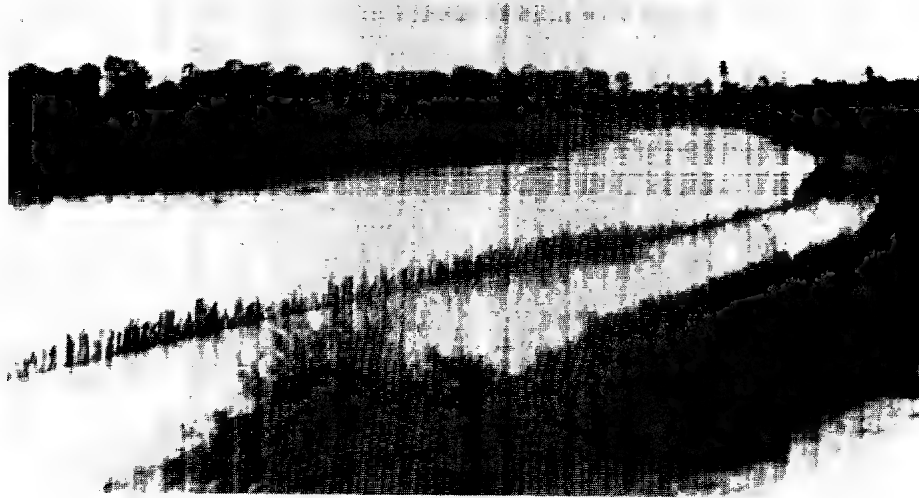
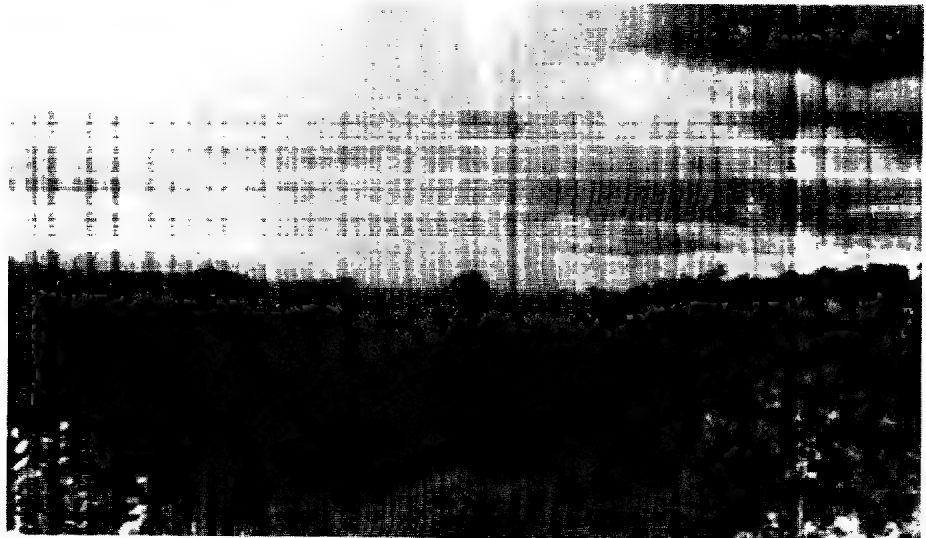


Figure 37. Reservoir in the Sertão. Dams have been constructed across many streams in the Sertão.



Figure 38. Storm in the Sertão. Most of the rainfall occurs as scattered showers.



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Little information is available concerning cloudiness and visibility, but visibility is probably unrestricted 90 percent of the time, except on the windward slopes along the north coast and on the eastern margin of the Sertão in Bahia.

The prevailing winds are light and are from the easterly quadrants.

The Sertão has the highest average annual temperatures in Brazil, ranging from approximately 68°F on the highest mountains to nearly 82°F on the northern lowlands. There is little seasonal variation in temperature; daily temperature variation ranges from about 11 to 18 Fahrenheit degrees.

c. Vegetation

A thorny scrub vegetation (caatinga) predominates in the Sertão. The vegetation in its most characteristic form consists of clumps of thorny trees, bushes, and cactuses separated by open areas (see Figure 39). These open areas are essentially bare during the dry season but are carpeted with grasses and spiny herbaceous plants during the rainy season. Most of the trees are low, twisted, and profusely branched. In the more characteristic clumps of caatinga the branches of trees, cactuses, and bushes are entangled, forming virtually impenetrable thickets.

Tropical forest occurs in humid areas on the summit of the Serra da Ibiapaba, and modified thorn forest occurs along the western slope. The thorn forest has a dense undergrowth of high bushes and various cactus species flourish. The stands are discontinuous and are separated by palm groves and grassy areas.

d. Land Use

The sparse rural population is supported primarily by open range cattle raising, the cultivation of tree cotton, and subsistence farming. Specialty crops such as castor beans, sugarcane, and sisal, as well as various tree crops, are grown in favored locations.

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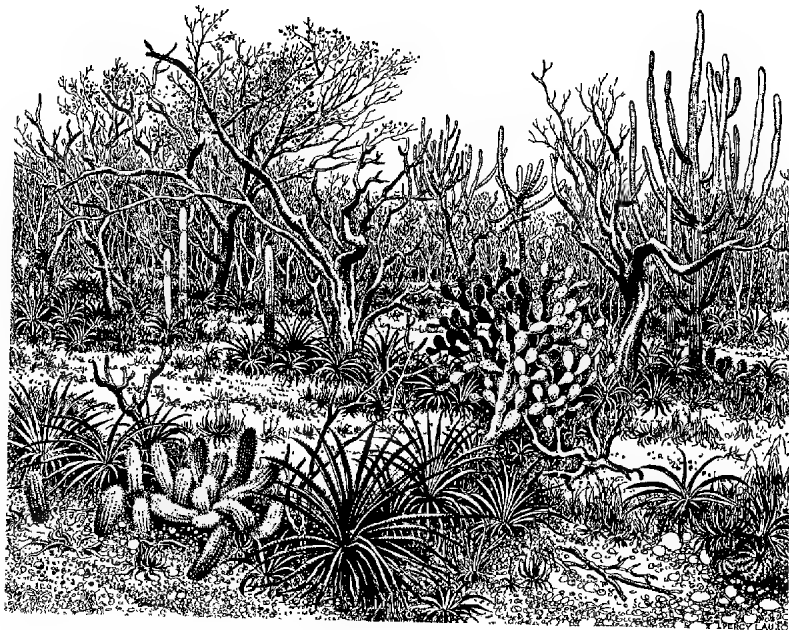


Figure 39. Caatinga. Clumps of thorn trees, bushes, and cactuses are separated by open areas.

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5. Parnaíba - Mearim Area

a. Terrain and Drainage

The Parnaíba - Mearim Subregion is a transitional zone between the humid Amazon Basin and the semiarid Sertão. It occupies much of the extensive basin area drained by the Parnaíba, Itapicuru, and Mearim rivers. The terrain rises gradually inland from a broad coastal plain through belts of rolling hills and fragmented tablelands to the Chapada das Mangabeiras, 2,000 to 3,300 feet in elevation, at the southern extremity of the region. The terrain also rises eastward from the Parnaíba Valley to comparable elevations along the crest of the Serra da Ibiapaba.

Most of the streams are perennial; however, the right-bank tributaries of the Rio Parnaíba become dry or nearly dry during the dry season (June through December). The principal rivers are bordered along their lower reaches by broad flood plains that are inundated during the high-water period.

b. Climate

The modified tropical savanna climate has two distinct seasons -- a summer-autumn rainy season and a winter-spring dry season. The rainy season extends from November through April in the southern part of the subregion and from January through June in the northern part. The average amount of rainfall received annually increases from southeast to northwest -- from a minimum of 36 inches to a maximum of 82 inches.

The incidence of fog is relatively high along the extreme eastern part of the coast -- from the Parnaíba Delta eastward.

Surface winds are variable in the interior, but northeast trade winds predominate along the coast.

The mean daily temperature of the subregion is about 80°F. The difference in temperature between the coolest and hottest months is about 5 Fahrenheit degrees. The daily temperature range is considerably greater than the annual range, averaging 11 Fahrenheit degrees near the coast and 22 Fahrenheit degrees at Barra do Corda in the interior.

c. Vegetation

The natural vegetation of the subregion is transitional between tropical rain forest and thorny scrub, its composition varying considerably from place to place. Mangrove swamps rim

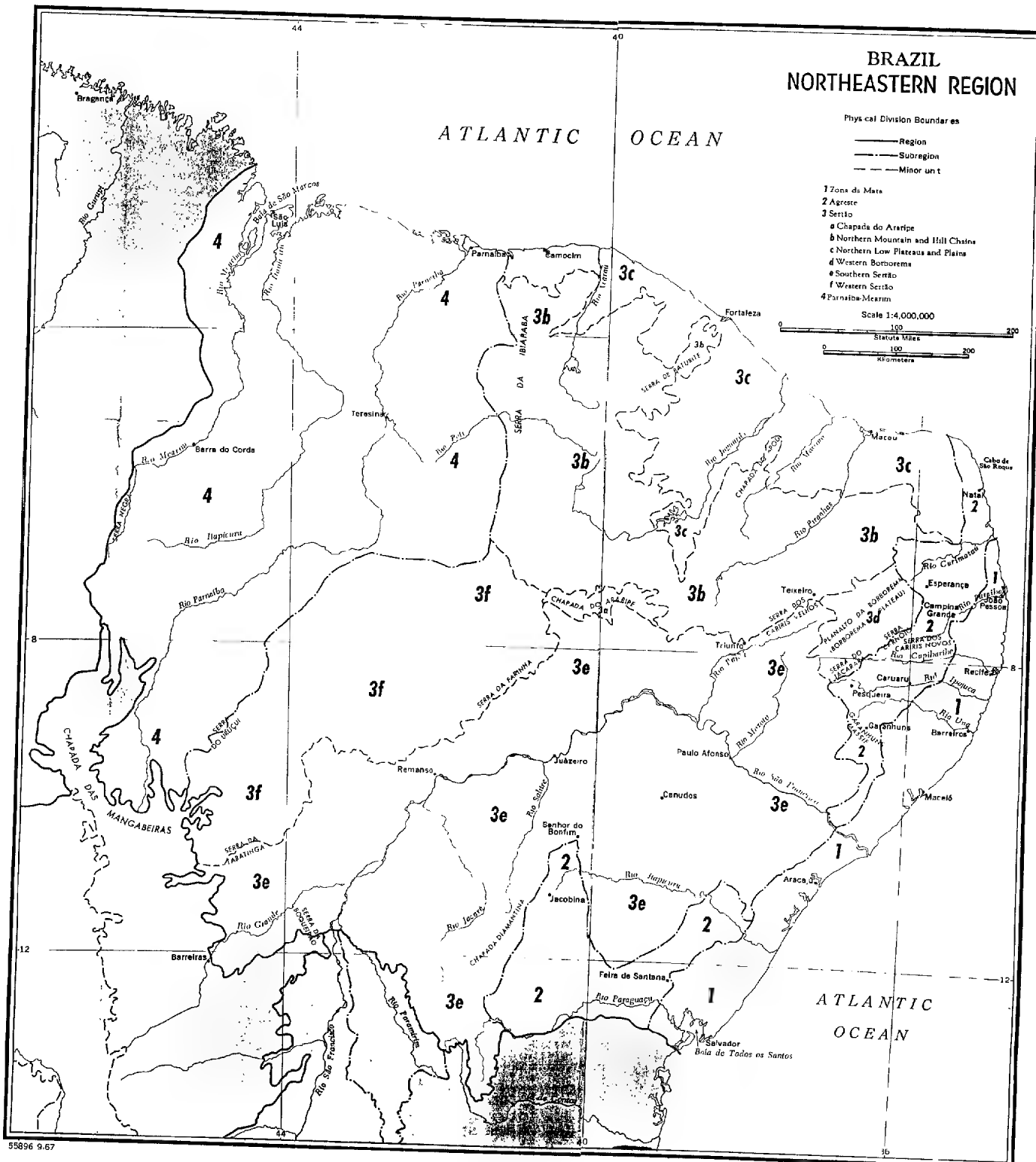
the bays and river mouths along the coast, and sand dune vegetation -- sparse grasses and low bushes -- covers most of the intervening coastal segments. An extensive area of marshy grassland subject to seasonal flooding occurs on the low-lying land south and west of Bahia de São Marcos. Gallery forests extend along the riverbanks, and discontinuous palm forests grow along river flood plains and in moist depressions on the coastal plain (see Figure 40). Small areas of second-growth forest occur on low hills and stream divides on the coastal lowland and in the adjacent belt of rolling hills. Various gradations of woodland savanna and dry forest cover the tablelands.

d. Land Use

Collecting forest products, primarily babassu nuts and carnaúba wax, constitutes one of the principal economic activities of the subregion. Large numbers of range cattle are grazed on the tablelands. Rice, cotton, manioc, sugar, and subsistence crops are grown along the principal valleys.

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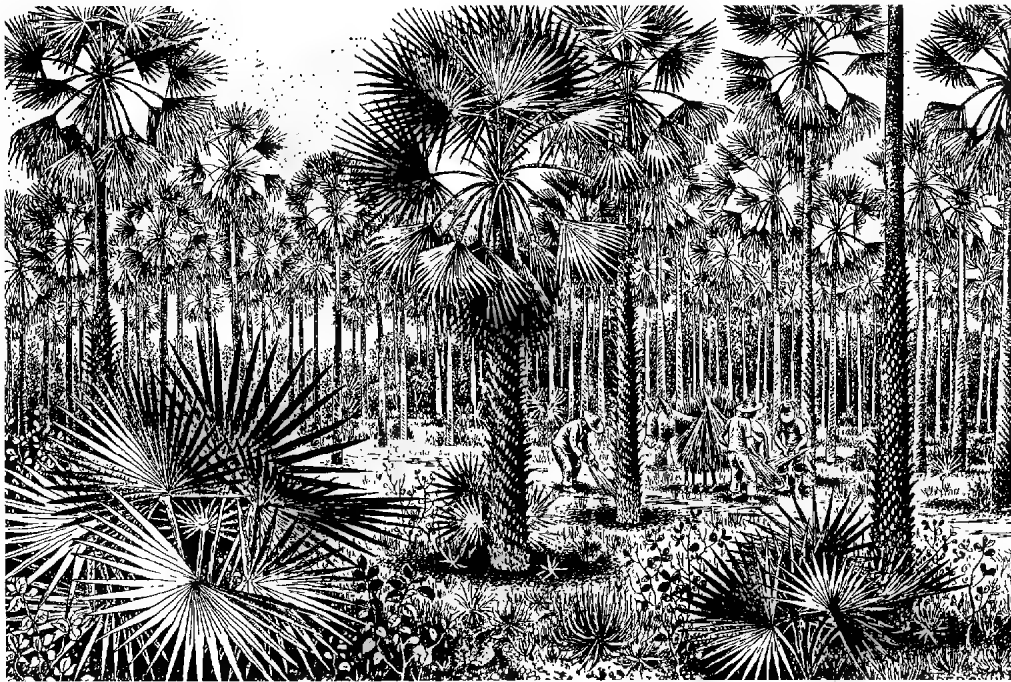
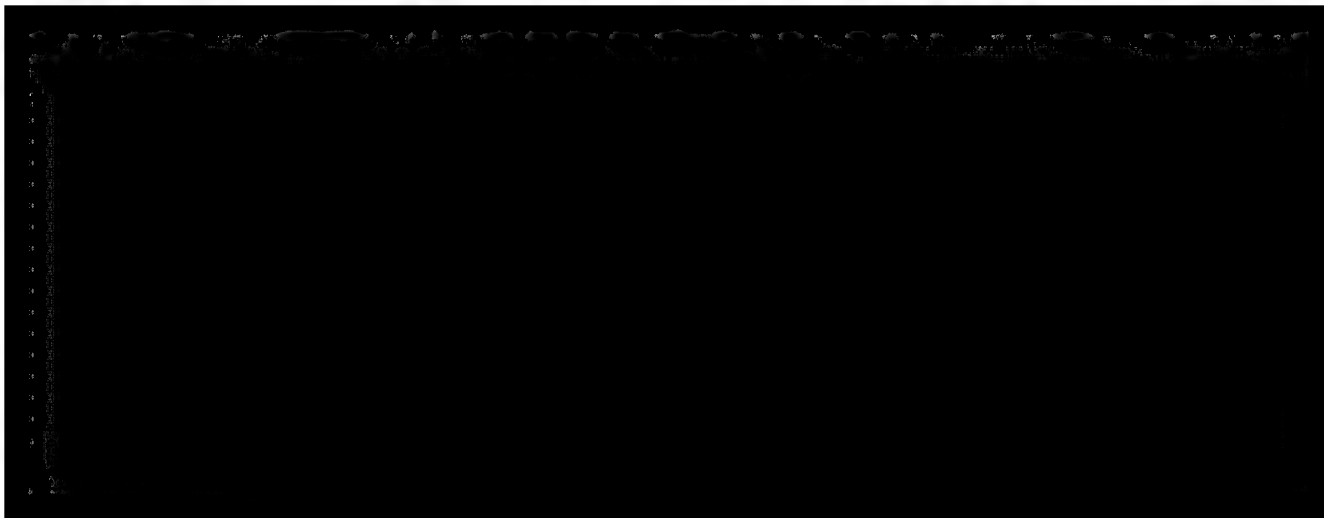


Figure 40. Carnaúba grove. This palm is dominant in the palm forests east of the Rio Parnaíba.



Figure 41. Serra do Espinhaço. Mountain ridges mark the eastern margin near Ouro Preto.



E. Eastern Region

See Map 55897

1. General

The populous Eastern Region is a complex area of hills, basins, and low mountains. It includes the states of Espírito Santo, Rio de Janeiro, and Guanabara, together with southern Bahia, most of Minas Gerais, and the extreme eastern part of São Paulo.

The region is divided into three subregions: the Central Highland, the Eastern Slope, and the São Francisco River Basin. The Central Highland, extending north-south through the center of the region, forms the high main water divide separating the dissected Eastern Slope from the São Francisco River Basin.

2. Central Highland

a. Terrain and Drainage

The Central Highland consists of two mountain ranges and a broad dissected plateau -- the Serra do Espinhaço, the Serra da Mantiqueira, and the Southern Minas Plateau.

The Serra do Espinhaço, 2,500 to about 6,900 feet in elevation, extends roughly from Conselheiro Lafaiete, in Minas Gerais, northward to the Chapada Diamantina. It is a highland belt whose summit area is flat to rolling along some sectors but is dissected into a confusion of ridges, hills, and deeply incised river valleys along other sectors (see Figures 41 through 44). The eastern and western margins of the highland belt are marked by steep slopes in most places.

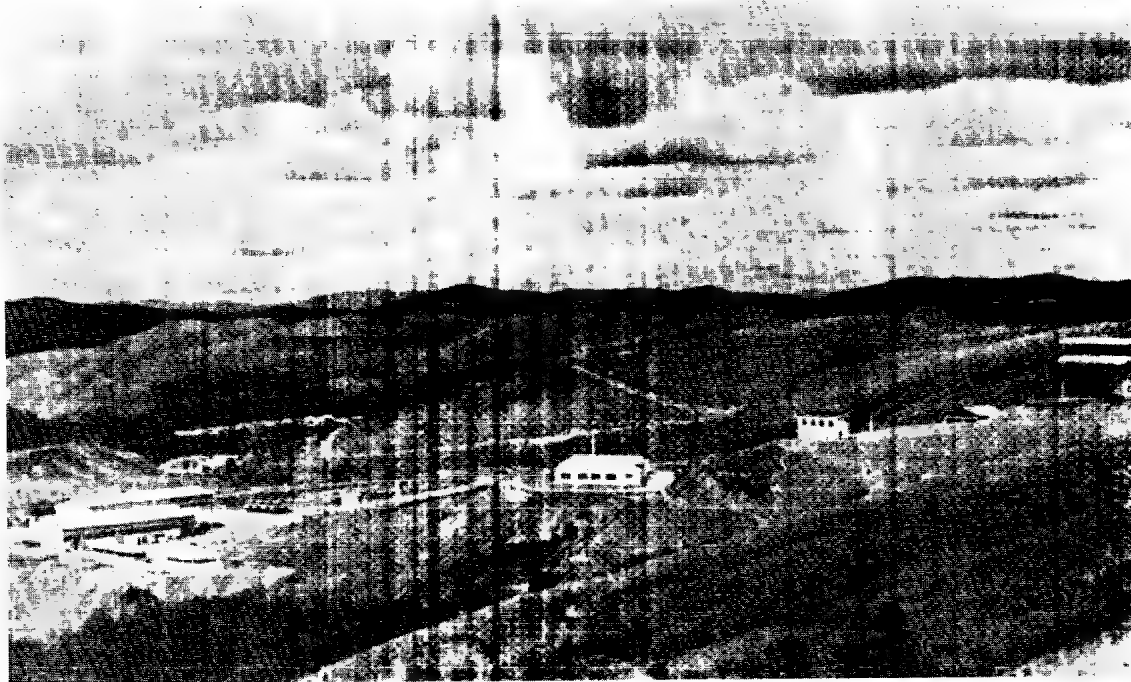


Figure 42. Southern Serra do Espinhaço. The interior is hilly near Itabirito.

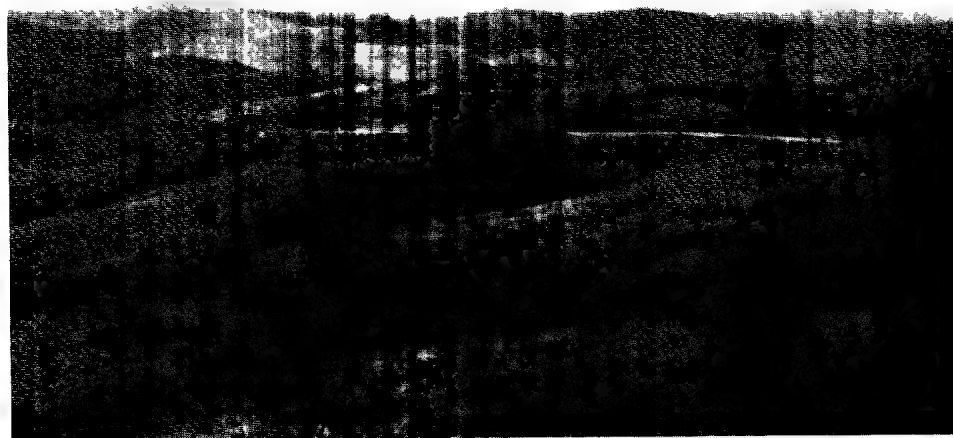


Figure 43. Serra do Espinhaço. This gently rolling highland area is located between Itabirito and Belo Horizonte.

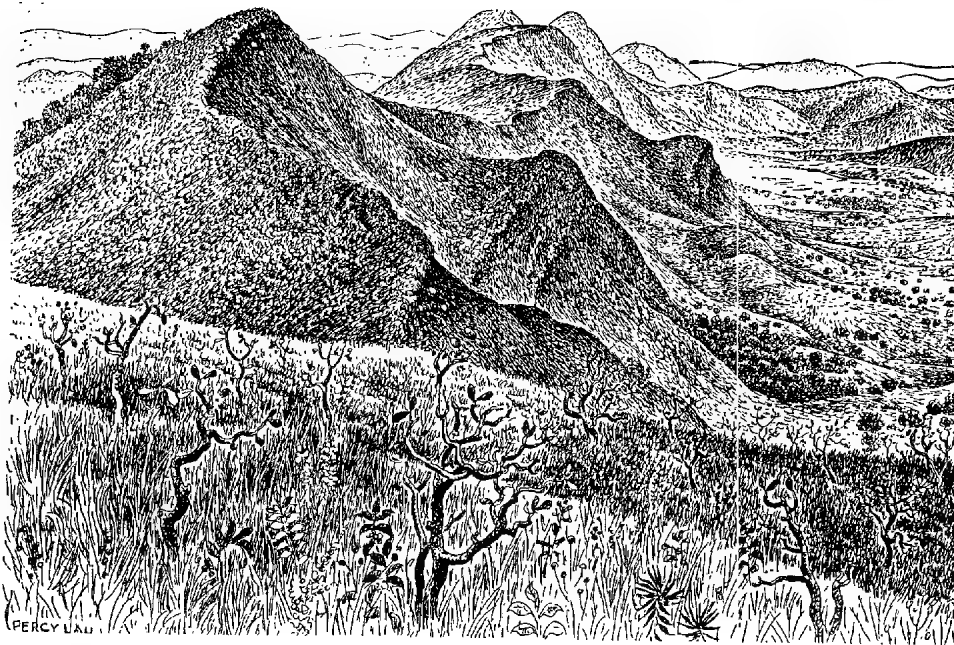


Figure 44. Serra do Curral. This is a segment of the Serra do Espinhaço near Belo Horizonte.



Figure 45. Peixoto Dam across Rio Grande on Southern Minas Plateau.

Only the western part of the Serra da Mantiqueira lies within the subregion. It extends from the extreme southern corner of Minas Gerais northeastward along the edge of the Southern Minas Plateau to Barbacena. The south-facing slope of the range rises abruptly 2,000 to 7,000 feet above the adjacent Paraíba do Sul Valley -- the main transportation corridor linking São Paulo and Rio de Janeiro. The north-facing slope merges with the Southern Minas Plateau.

The Southern Minas Plateau constitutes the upper drainage basin of the Rio Grande and slopes gradually northwestward from the Serra da Mantiqueira toward the Paraná Basin. Much of the plateau has been dissected into a sea of low hills that rise to a common summit level (see Figures 45 and 46).

Most mountain streams of the Serra do Espinhaço and the Serra da Mantiqueira flow through narrow, steep-sided valleys interrupted by rapids and falls, whereas the rivers of the Southern Minas Plateau meander along broad valleys that are marshy in places. Most streams are perennial, although some of the mountain streams originating on dry leeward slopes are intermittent. High water occurs from November through April or May in the greater part of the subregion, and low water occurs in the winter, reaching the lowest level in August or September.

The Furnas Dam backs up the waters of the Rio Grande and its tributary, the Rio Sapucaí, forming an extensive reservoir in the north-central part of the Southern Minas Plateau.

b. Climate

The mild climate reflects the cooling effects of altitude. Distinct dry and rainy seasons are experienced throughout the subregion. The average annual rainfall ranges from 25 to 79 inches -- increasing in amount from north to south and from west to east. The rainy season extends, in general, from October or November through March or April.

Cumulus clouds predominate over the highlands. During the rainy season clouds may envelop the windward slopes of the higher mountain ridges in the afternoon, when the greatest cloud development normally occurs. Early morning fog occurs along the southern and eastern margins of the subregion on an average of 60 to 90 days per year.

Surface winds are generally relatively weak, but high winds may be experienced briefly during thunderstorms. Wind directions are primarily from the easterly quadrants.



Figure 46. Southern Minas Plateau. Rugged terrain prevails along the southwestern border.



Figure 47. Vegetation on Central Highland. Open grasslands occur locally on flat to rounded summit areas.

The mean annual temperature ranges from a low of 53°F on the highest part of the Serra da Mantiqueira to a high of 72°F in the northern Espinhaço. Similarly, the mean maximum temperature ranges from 57°F to 82°F, and the mean minimum temperature ranges from 50°F to 60°F.

c. Vegetation

The natural vegetation ranges from caatinga and woodland savanna to open grassland and scattered tracts of second-growth forest.

Caatinga predominates in the drier northern part of the Serra do Espinhaço. It consists of clumps of thorny trees, bushes, and cactuses separated by open areas that are covered with grasses and spiny herbaceous plants during the rainy season and are bare during the dry season.

The woodland savanna is the predominant vegetation on the middle and southern parts of the Serra do Espinhaço and along the northern margin of the Southern Minas Plateau. It consists of a ground cover of grasses and herbaceous plants interrupted by scattered trees and clumps of trees and shrubs. The grasses flourish during the rainy season but dry up during the dry season.

The patches of second-growth tropical semideciduous forest generally occur on the steeper slopes in humid areas of the highland. About 10 to 30 percent of the trees in the forest stands lose their leaves during the dry season. The stands are relatively dense, and numerous lianas are interlaced among the trees.

The grasslands, which are characterized by a sparse growth of grasses, mosses, and small bushes, occur on high flat-to-rounded summit areas (see Figure 47).

d. Land Use

The northern and central parts of the Serra do Espinhaço are sparsely populated, and the principal economic activity is open range grazing. In the southern part the population is primarily centered around the iron mining and metallurgical centers. A sparse population occupies the intervening rural areas, where subsistence farming and livestock grazing are the principal agricultural activities.

The Campos do Jordão area of the Serra da Mantiqueira has become an important health and tourist resort center. Horticulture is practiced along the broad river valleys of this area,

and range cattle are grazed on the grassy rounded summits. Dairying and subsistence farming are the principal forms of land use on the lower slopes of the Serra da Mantiqueira.

25X6D Mixed farming and livestock raising are practiced on most of the Southern Minas Plateau.

3. Eastern Slope

a. Terrain and Drainage

The Eastern Slope, by far the largest subregion in the Eastern Region, encompasses the complex zone of hills, low mountains, plateaus, and valleys between the Central Highland and the coast. In general, the land rises in a series of broad steps from the coast toward the interior, but this progression is interrupted locally by discontinuous low mountains and by complex river basins.

The Northern Sector of the subregion consists of a belt of low coastal hills and/or tablelands (tabuleiros) backed by a belt of more rugged hills. These, in turn, are backed by broad segments of the Bahian Plateau (see Figure 48). To the

south the deeply grooved Jequitinhonha River Basin forms a transitional zone between the Bahian Plateau and the hilly Central Sector.

The Central Sector includes a coastal plain and tabuleiro belt, a complex belt of ridges and valleys situated along the Espírito Santo - Minas Gerais border (the Serra dos Aimorés), and the Rio Doce Basin, which cuts back through the ridge and valley complex and spreads out to form a large, hilly basin in the interior.

The Southern Sector consists of an irregular zone of coastal lowlands (see Figure 49), the Serra do Mar (known also as the Great Escarpment of the coastal mountain range) (see Figures 50 and 51), the drainage basin of the Rio Paraíba do Sul, and the massive Serra do Caparaó and associated highlands that form the water divide between the Rio Doce and Rio Paraíba do Sul drainage basins (see Figure 52). The Serra do Caparaó culminates in the Pico da Bandeira, the highest point in Brazil (elevation 9,482 feet).

The main rivers of the Northern Sector are perennial, but their flow is greatly reduced from June through August or September, when they meander along wide beds strewn with alluvial debris. The secondary streams in the interior have a torrential flow during the high-water period (November through April or May) but dry up during the dry season. The rivers and streams of the Central and Southern Sectors are perennial, and most of them flow along narrow, steep beds interrupted by frequent rapids and falls. The Rio Doce and Rio Paraíba do Sul are exceptions, having low gradients along parts of their middle and lower courses. The period of high water within the Central and Southern Sectors generally extends from October through April, with the highest or flood level occurring in December or January.

b. Climate

The climate of the Eastern Slope is varied -- ranging from semiarid to superhumid and from tropical to subtropical. The amount of rainfall received decreases from the coast inland and from south to north. A summer rainy season and a winter dry season are experienced throughout most of the subregion. In general, the rainy season extends from October or November through March or April, but along the Bahian coast the maximum rainfall occurs from March to August. The length and intensity of the dry season varies markedly, being greatest in the interior of the Northern Sector and least along the Bahian coast and along the seaward-facing slopes of the Serra do Mar and Serra do Caparaó. The annual average rainfall ranges from 25 inches to 157 inches.



Figure 48. Northeastern margin of Bahian Plateau. Oddly shaped hills with nearly vertical slopes of bare rock occur locally.

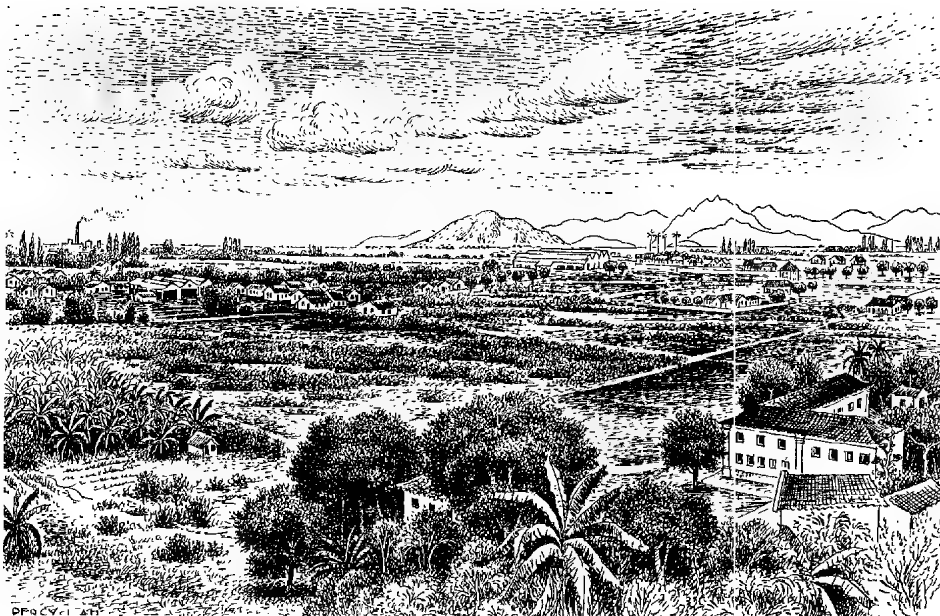


Figure 49. Campos Plain. This extensive coastal lowland is situated along the lower Rio Paraíba do Sul.

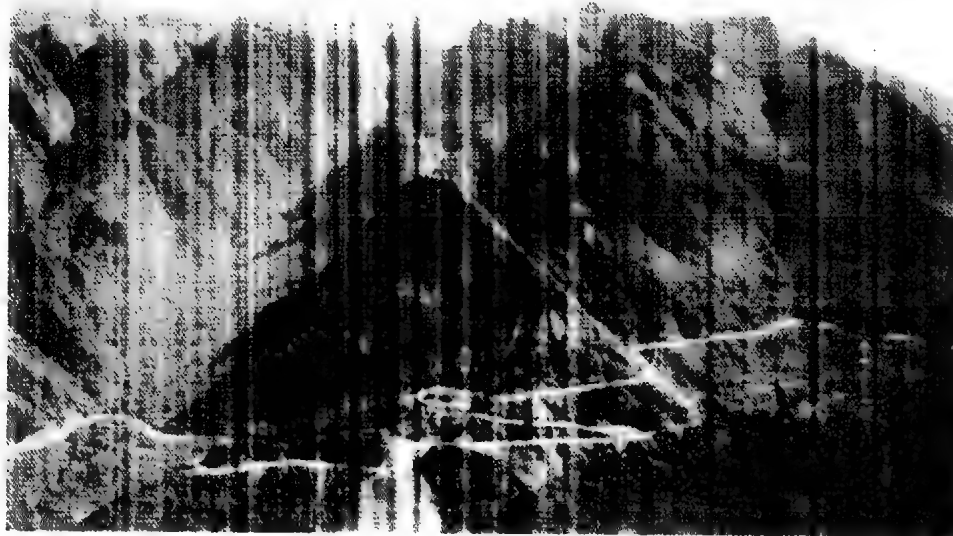


Figure 50. Serra do Mar between Rio de Janeiro and São Paulo.

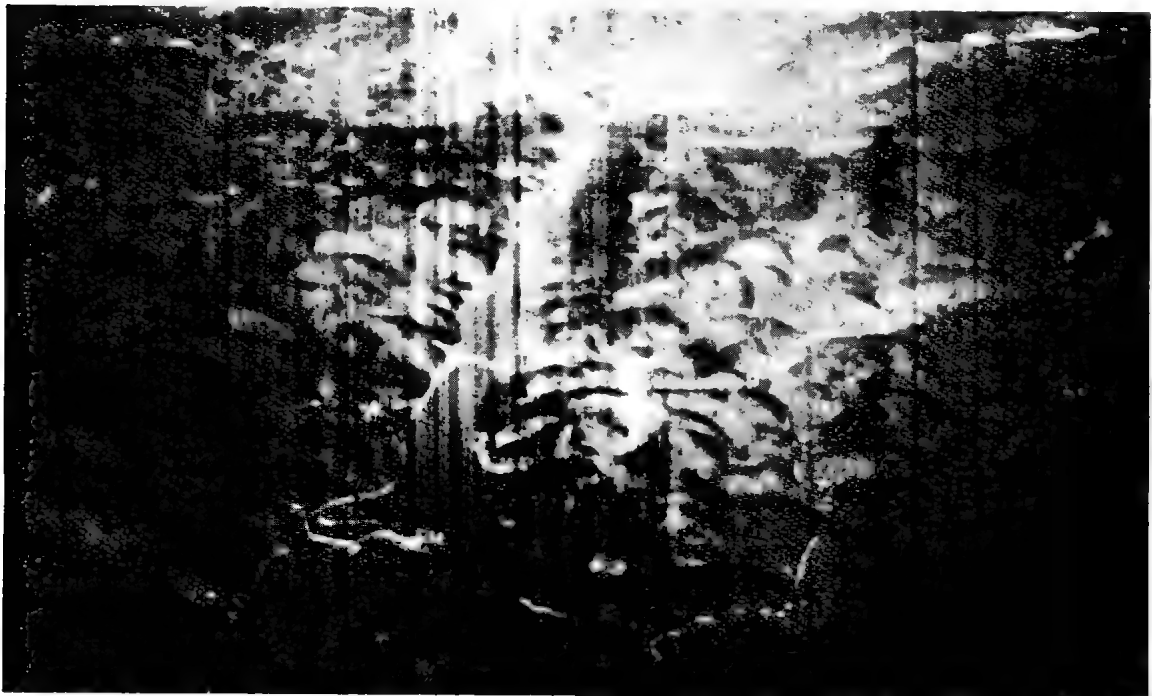


Figure 51. Serra do Mar. Parts of the backslope have been eroded into a sea of hills.



Figure 52. Rugged terrain along southern margin of Serra do Caparaó.



Figure 53. Coastal rain forest on Eastern Slope.

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Stratus clouds, low ceilings, and poor visibility may all occur during the passage of cold fronts in winter. In summer, cumulus clouds may envelop the windward slopes of the mountain ridges in the afternoon, when the greatest cloud development normally occurs. Early morning fog occurs on an average of 30 to 90 days per year. The incidence appears to be greatest in areas of rugged terrain and lowest in the larger valleys that open toward the east.

Surface winds are generally weak. In the Northern Sector southeasterly trade winds prevail in winter and easterly winds tend to predominate in summer. Winds are variable in the Central and Southern Sectors.

Average annual temperatures range from a high of 75°F in the valleys and low hill belts near the coast to a low of about 55°F on the highest mountain crests. Mean annual maximum temperatures range from a high of about 86°F to a low of 65°F; mean annual minimum temperatures range from a high of approximately 68°F to a low of less than 50°F.

c. Vegetation

The natural vegetation varies considerably from the coast inland and, to a lesser extent, from north to south. Mangrove and beach vegetation extend along the shore. Stands of coastal rain forest cover some of the windward slopes of the rugged hills and low mountains that parallel the coast (see Figure 53). The rain forest gives way to scattered patches of tropical semi-deciduous forest on rugged terrain in the interior of the subregion. In the Northern Sector caatinga predominates on the western part of the Bahian Plateau. Throughout the subregion extensive areas have been cut over and are devoted to pasture or cultivation.

The stands of coastal rain forest are quite similar to the tropical rain forest of the Northern Region. The trees of the upper story form a closed canopy. Lower trees and shrubs crowd the space below the canopy, but no clearly marked stratification is discernible. The undergrowth is dense, and lianas and dangling aerial roots form a tangled net between trees.

About 10 to 30 percent of the trees in the semideciduous forest lose their leaves during the dry season. There are numerous clearings in the forest, some in various states of regrowth and others planted in grass or subsistence crops. The undergrowth is generally dense.

Caatinga vegetation consists of virtually impenetrable thickets of low trees, bushes, and cactuses, interspersed among generally open areas.

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d. Land Use

Cacao cultivation and livestock grazing are the principal forms of land use in the Northern Sector. Cacao is grown on low hills near the coast, and livestock is raised on the plateaus, valleys, and lower hill slopes in the interior (see Figure 54).

The basic pattern of land use in the relatively densely populated Central Sector consists of cattle raising and shifting cultivation. However, coffee growing is significant in parts of the Rio Doce Basin and on the eastern slopes of the Serra dos Aimorés, and some sugarcane is grown along the main river valleys. Mining and metallurgy are important in the western part of the Rio Doce Basin and along the eastern slope of the Serra do Espinhaço. Some of the forests are exploited for wood and charcoal (see Figure 55).

Land use is varied in the Southern Sector. Dairying and shifting cultivation are widespread. Coffee, sugarcane, and rice are important commercial crops (see Figure 56). Several industrial centers have developed along the valley of the Rio Paraíba do Sul, and several resort towns are located on the summit of the Serra do Mar.

25X6D



Figure 54. Cacao cultivation on low hills along Bahian coast. Cacao is grown in the shade of stands of partially cutover forest.



Figure 55. Charcoal burners at work.



Figure 56. Harvesting sugarcane and maize. View is along the middle basin of the Rio Paraíba do Sul.

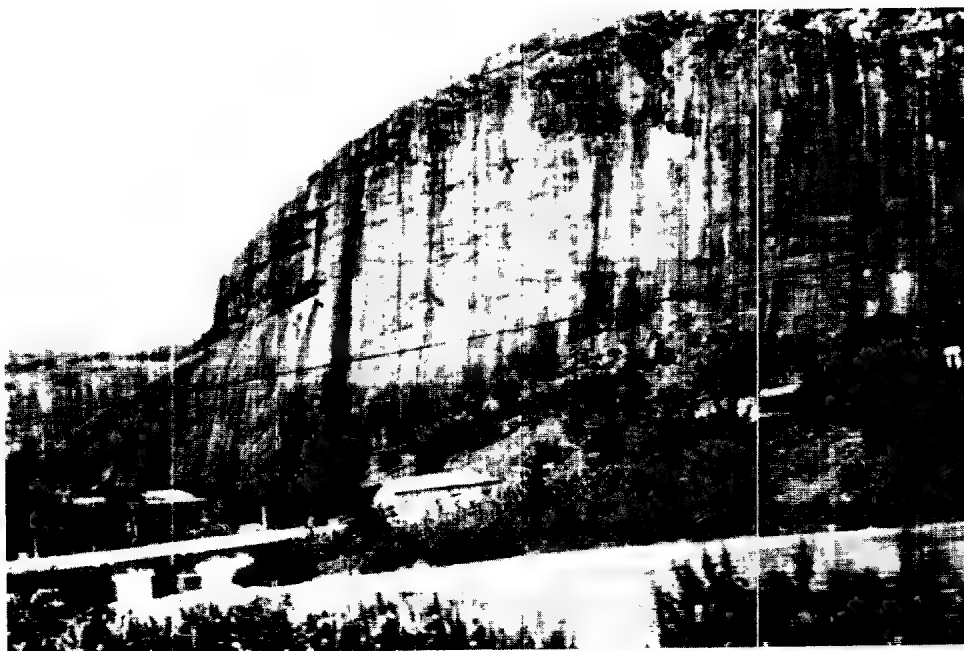
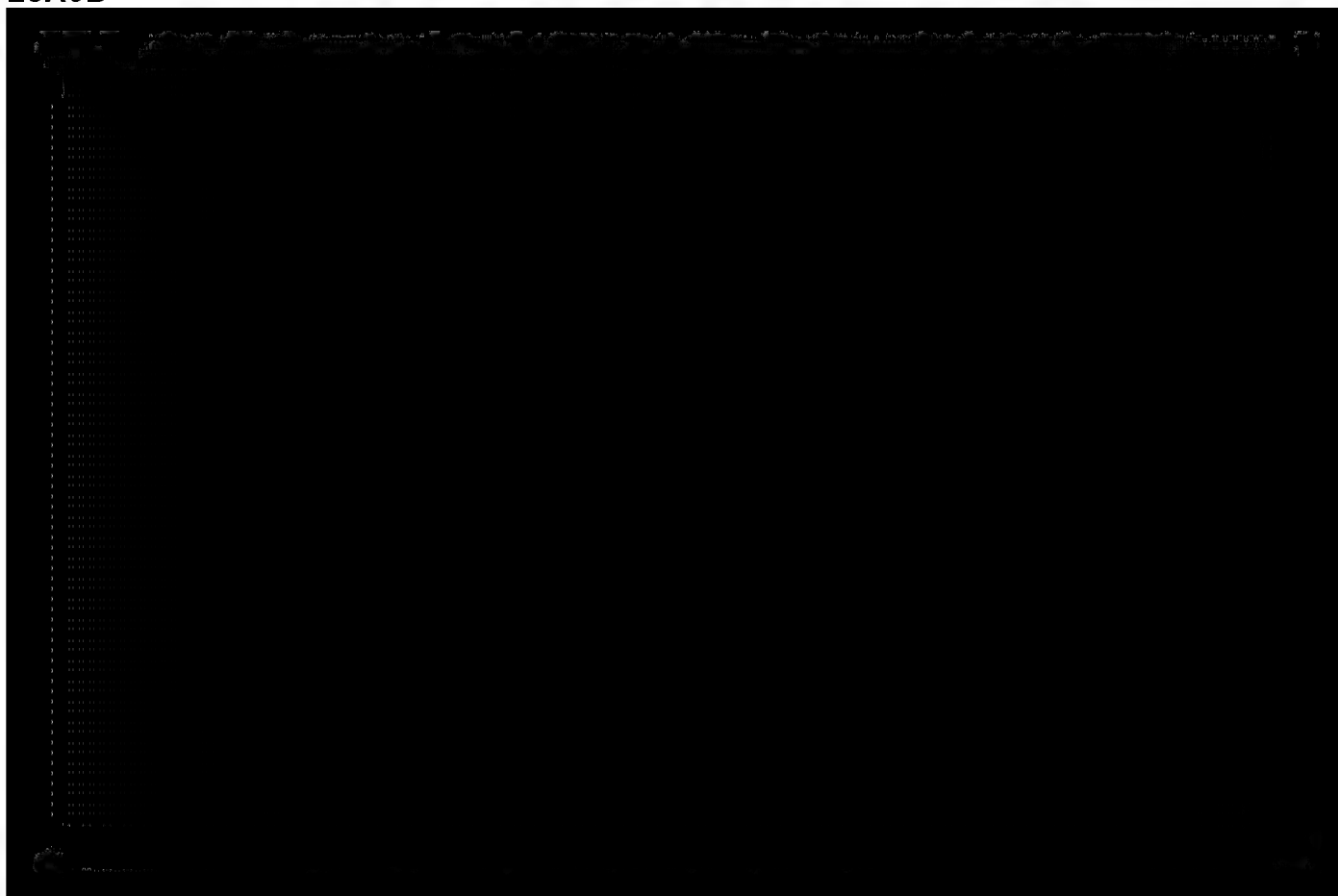


Figure 57. Escarpments in the Zona da Mata of Minas Gerais.



4. São Francisco River Basin

a. Terrain and Drainage

The upper basin and part of the middle basin of the Rio São Francisco fall within the Eastern Region. The headwaters of the river are situated along the northern margin of the Southern Minas Plateau. The basin is bordered on the east by the scarped slopes of the Serra do Espinhaço and on the west by the bluffs of the Espigão Mestre. The upper basin is generally hilly (see Figure 59), whereas most of the middle basin consists of broad, relatively flat surfaces, separated by stream valleys cut below the general surface level. Scattered rocky hills rise above the basin floor at various places. The main river is bordered by a broad marshy flood plain.

Most of the tributary streams south of the Bahia - Minas Gerais border are perennial; in contrast only the main rivers are perennial north of the border, where many secondary streams flow only after rainstorms and some may be dry several years in succession. Numerous small lakes, marshes, and swamps are



Figure 58. Shore near Cabo Frio. Beaches are backed by sand dunes.

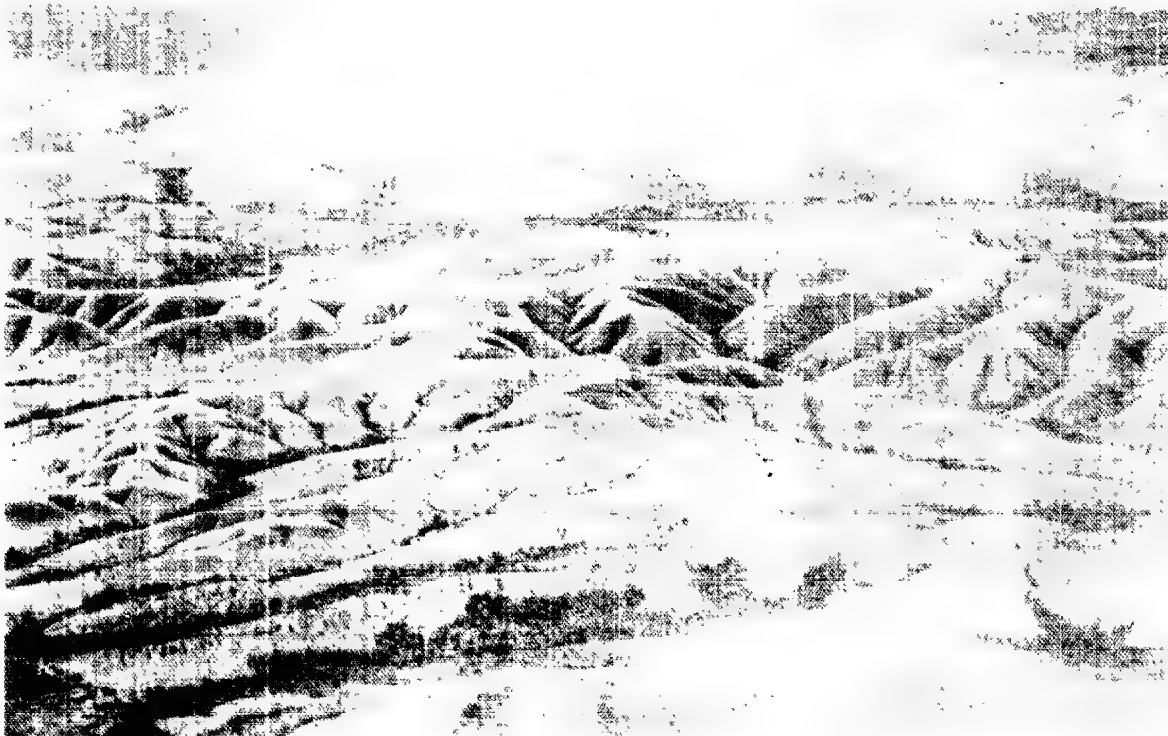
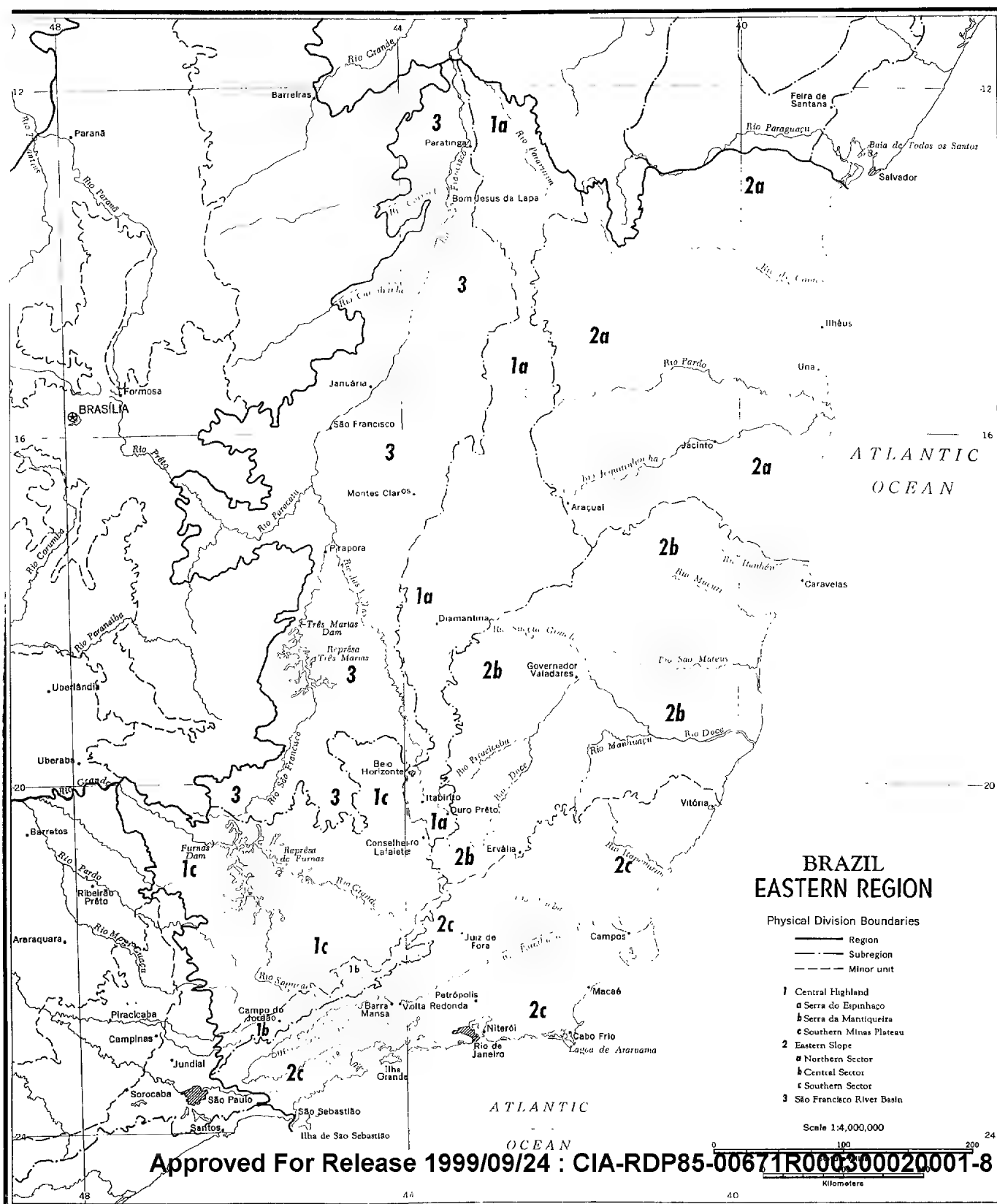


Figure 59. Maze of dissected low hills within upper São Francisco River Basin.



scattered along the flood plain of the main river. The water level on the Rio São Francisco usually starts to rise in November and reaches its highest level in December or January. The period of low water generally occurs between June and October. The Três Marias Dam across the Rio São Francisco has formed a sizable reservoir along a 60-mile segment of the upper river valley.

b. Climate

A tropical savanna climate, characterized by a distinct summer rainy season and winter dry season, prevails over most of the subregion. The length of the rainy season varies from 3 to 6 months, increasing from north to south. The average annual rainfall ranges from a low of about 30 inches at the northern border of the subregion to a high of about 60 inches along its southern margin.

Little reliable information is available on the winds of the subregion. Normally, there are no high winds other than gusts accompanying thundershowers. Visibility is generally good, except during summer showers.

The average annual temperature normally decreases from north to south and from the basin floor to the bordering highlands. The mean annual temperature ranges roughly from 70°F to 79°F. The mean minimum temperature ranges from 60°F to 71°F, and the mean maximum from 79°F to about 93°F.

c. Vegetation

The vegetation consists mainly of caatinga and woodland savanna, although bands of gallery forest extend along the river valleys.

Caatinga predominates in the part of the basin extending northward from the Bahia - Minas Gerais border.

Woodland savanna predominates south of the state boundary. This vegetation consists basically of sparse natural grassland with scattered trees and clumps of trees and shrubs. The grass is high during the rainy season but dries up during the dry season.

Semideciduous gallery forest border most of the rivers in the basin. These forest belts are relatively broad south of the Bahia - Minas Gerais border and spread out over the flood plain of the Rio São Francisco and its principal tributaries.

d. Land Use

Much land is devoted to livestock grazing. Cattle are raised in the zone of woodland savanna, and goats and donkeys are grazed on the caatinga. Subsistence crops are grown in many localities in the southern part of the subregion and in humid areas in the north. Castor beans and cotton are frequently raised as cash crops by subsistence farmers. Fish are caught in considerable quantity from the sandbars along the Rio São Francisco during the low-water period.

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F. Southern Region

See Map 55899

1. General

The Southern Region, consisting of the states of Rio Grande do Sul, Santa Catarina, Paraná, and most of São Paulo, is the smallest of the five regions of Brazil. It enjoys a relatively cool climate, and is the most populous and the most economically developed part of the country.

The principal terrain units of the region are the extensive Southern Plateau and the Eastern Slope. The Southern Plateau encompasses about 75 percent of the area and varies considerably in surface configuration from state to state. The Eastern Slope consists of the dissected eastern edge of the plateau and the coastal belt at its base.

2. Southern Plateau

a. Terrain and Drainage

The Southern Plateau rises abruptly above the narrow coastal zone and slopes gradually westward to the valleys of the Rio Paraná and Rio Uruguai. In the northern half of the subregion the plateau is divided into three segments, known as the First Plateau, the Second Plateau, and the Third or Western Plateau. The segments are situated at different elevations and separated from each other by roughly parallel lines of escarpments. These escarpments are breached by the principal westward-flowing rivers that drain the plateau. The Third Plateau is by far the most extensive, and it constitutes the entire plateau in the southern part of the subregion. The plateau decreases in elevation both from east to west and from north to south. The low undulating section in the southwestern part of Rio Grande do Sul forms part of the cattle-raising zone known as the Campanha Gaúcha (see Figure 60).

The First Plateau is hilly, and the relief is generally rugged (see Figures 61 and 62). The Second Plateau is an area of generally low relief, and, in São Paulo, it is called the Inner Lowland since it is situated below the general surface level of the other segments of the plateau (see Figure 63). Historically, it has served as a natural corridor of movement -- particularly as the route of the famous cattle and mule drives. The Third Plateau is one of the largest lava plateaus in the world, and it exhibits a relatively uniform tabular relief (see Figures 64 and 65). The steep-sided valleys of the principal rivers subdivide it into a series of broad, roughly parallel surfaces trending from east-southeast to west-northwest.

Flood plains are generally lacking along the rivers of the First Plateau. On the Second Plateau, however, the main rivers meander along broad, marshy flood plains. On the Third Plateau the valleys vary in width in different sectors, and marshy flood plains occur along some of the wider sectors. In general, the river courses are interrupted by scattered falls and rapids, and most of the minor tributaries on the Third Plateau enter the main valleys over such obstacles. The Rio

Figure 60. Low undulating surface of Campanha Gaúcha.

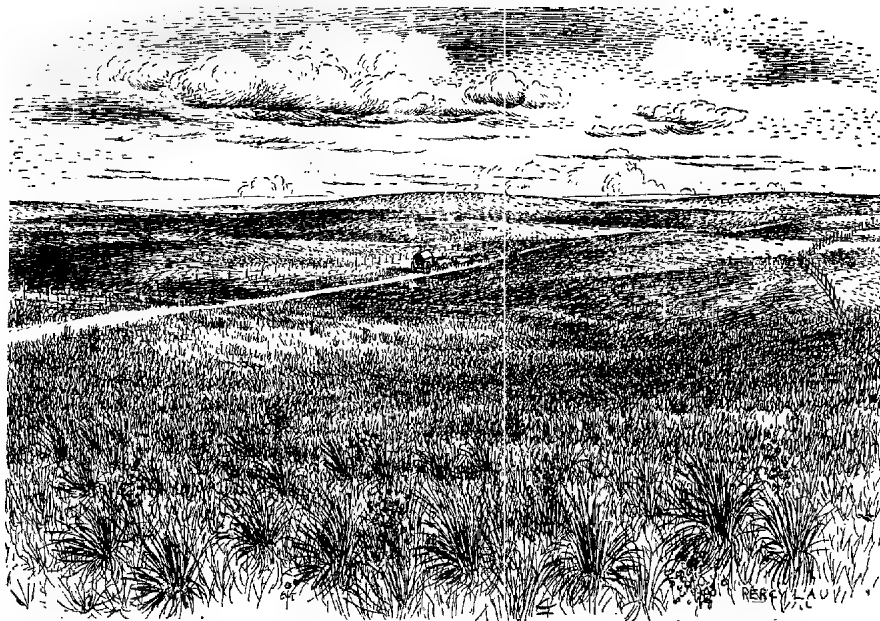


Figure 61. First Plateau southeast of São Paulo. The Rio Grande Reservoir is in the background.

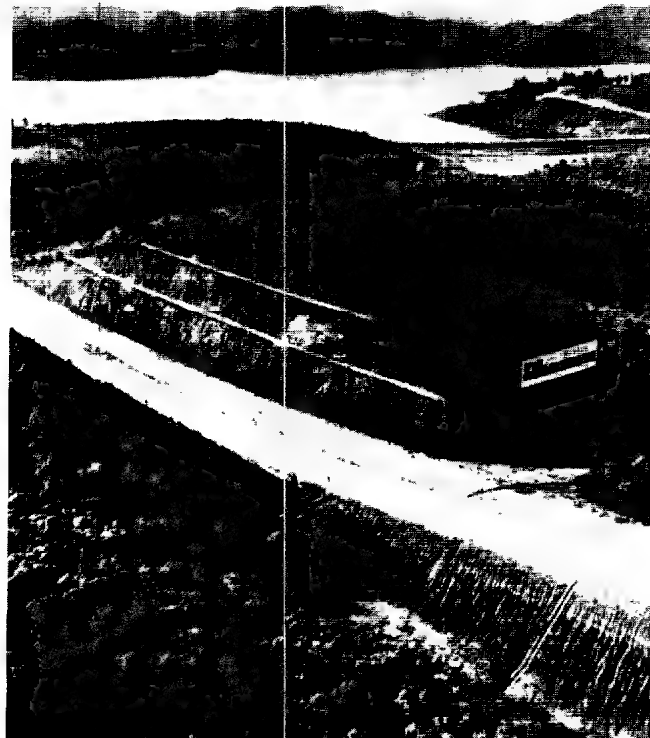




Figure 62. Hills east of Campinas. Coffee cultivation in the foreground; pastures in the middle ground; and patches of forest in the background on the hilltop and steep slopes.



Figure 63. The Second Plateau. The area is of generally low relief.

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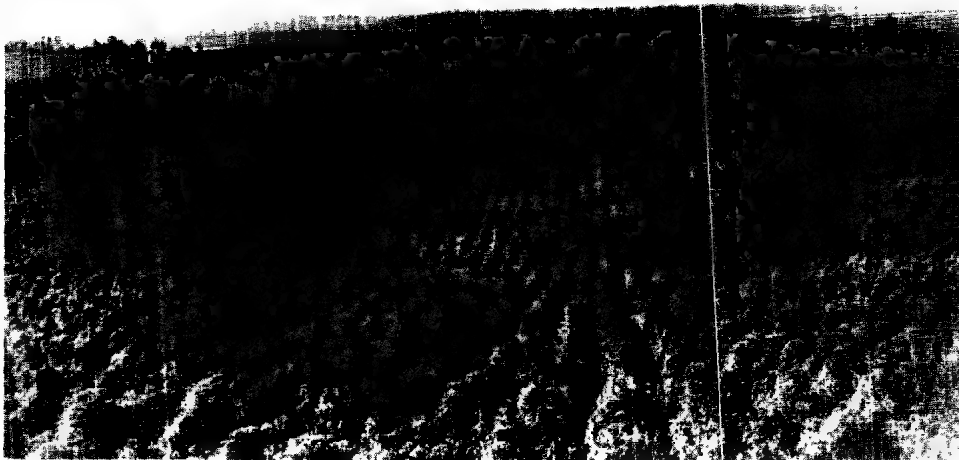


Figure 64. The Third Plateau. The area is flat to gently rolling in the vicinity of Londrina, Paraná. Coffee is grown extensively on the terra roxa soils in this area.

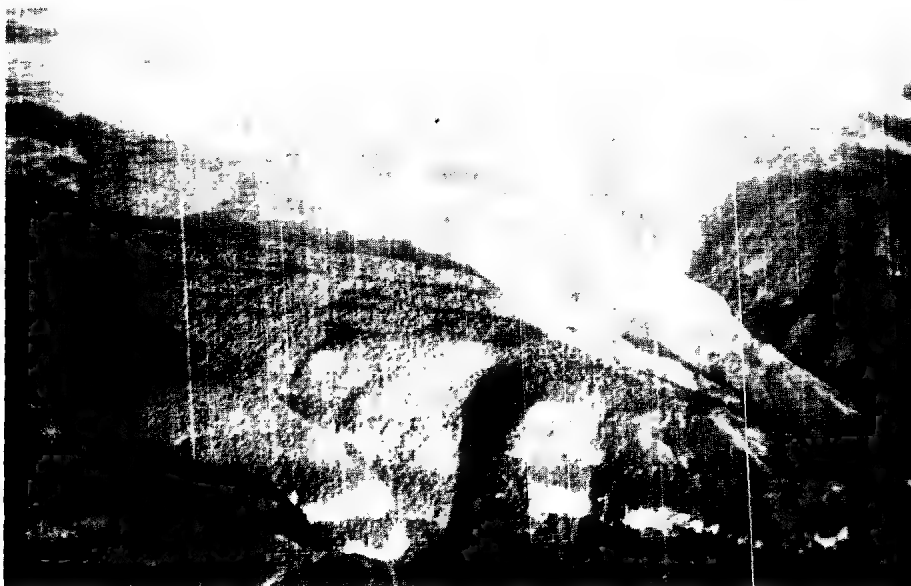


Figure 65. The Third Plateau. Narrow V-shaped valleys are cut below the general surface level along the high eastern margin in Rio Grande do Sul.

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S-E-C-R-E-T

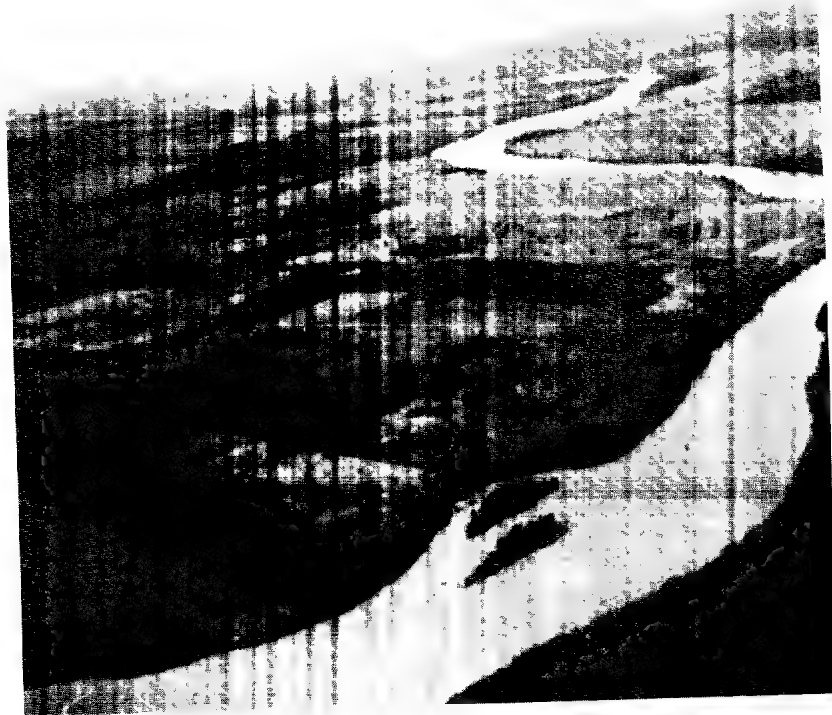


Figure 66. Rio Paraná and flood plain upstream from Guafira.



Figure 67. Iguazu Falls. Tributaries, such as the Rio Iguazu, enter the canyon of the Rio Paraná over falls situated at the heads of short side canyons.

Paraná is a broad river of low gradient downstream as far as Guaíra, where it flows over spectacular waterfalls (see Figure 66). Below the falls the river is confined within canyon walls, and all the tributaries that enter it along this sector flow over waterfalls (see Figure 67).

Rivers and streams are perennial, but minor tributaries are generally quite shallow at low-water stage. In São Paulo and northern Paraná the period of high water extends from November or December through April or May. In southern Paraná and Santa Catarina there is a slight spring-summer rainfall maximum; however, the period or periods of high water vary somewhat locally. In Rio Grande do Sul the high-water period extends from April or May through October or November (see Figure 68).

b. Climate

The climate of the Southern Plateau ranges from tropical savanna in northern São Paulo to humid subtropical in southern Paraná, Santa Catarina, and Rio Grande do Sul. A zone of transitional climate occurs in southern São Paulo and northwestern Paraná.

The amount and seasonal distribution of rainfall varies considerably within the subregion. Areas of heaviest rainfall coincide with higher elevations situated in the path of moisture-bearing winds. The average annual rainfall ranges from 40 inches to more than 80 inches. In most of São Paulo and extreme northwestern Paraná, rain falls primarily during the summer (October through March). Rain occurs throughout the year in Santa Catarina and most of Paraná, with a slight maximum during the spring-summer period. In Rio Grande do Sul the maximum amount of precipitation occurs during the autumn-winter period. In mid-winter frontal passages frequently bring snow to the higher parts of the plateau in Rio Grande do Sul. Snow seldom remains on the ground for more than a few days, however.

Dense fogs and low clouds restrict visibility along the coastal margin of the plateau. Fog occurs here about 9 to 18 days per month during the autumn-winter period (April through August) and with lesser frequency during the rest of the year. Dense fogs also occur from 6 to 12 days per month during the autumn-winter period along the Uruguai Valley and along segments of the Paraná Valley. Visibility is generally unrestricted in other parts of the subregion about 90 percent of the time.

Surface winds are generally weak. High winds, when they occur, are associated with thunderstorms. Wind direction varies considerably, but winds from easterly quadrants tend to dominate.

The temperature decreases from north to south and with increased elevation. The mean annual temperature ranges from about 60°F to 74°F. The mean minimum temperature ranges from 50°F to 64°F, and the mean maximum temperature ranges from 68°F to 86°F. Frosts occur from 5 to 25 days per year in the southern part of the subregion. The incidence of frost ranges from 5 days a year to 1 day in two years.

c. Vegetation

The vegetation of the Southern Plateau consists of tropical semideciduous forest, Paraná pine forest (araucária), natural grassland, and woodland savanna.

Some virgin stands of tropical semideciduous forest remain on parts of the plateau in northwestern Paraná and along the middle and lower valleys of the principal rivers in that state. Scattered small tracts of forest remain on steep slopes and along stream courses in São Paulo. In general, the undergrowth is dense, and lianas and dangling aerial roots form a tangled net between trees.

A Paraná pine forest grows on parts of the plateau within southern Paraná, Santa Catarina, and northern Rio Grande do Sul (see Figure 69). The Paraná pine is a tall needle-leaf evergreen tree with an umbrella-shaped crown. The upper tree layer, consisting primarily of tall pines, has an open canopy. Various broadleaf evergreen trees and shrubs, including the erva-maté, form a relatively dense lower story. The erva-maté (Paraguay tea plant) is exploited commercially, and in some stands competing tree species of the lower story are cut in order to promote its growth. The forest stands are relatively free of lianas and epiphytes.

The grasslands are of two kinds -- treeless savannas (campos limpos) and prairie. Treeless savannas extend along the eastern part of the Second Plateau and occur in several areas of high elevation on the Third Plateau in Paraná, Santa Catarina, and Rio Grande do Sul (see Figure 70). The prairie grasslands cover the low undulating surface of the Campanha Gaúcha in southwestern Rio Grande do Sul.

The scattered small areas of woodland savanna in the subregion occur mainly on the Second Plateau within São Paulo. The woodland savanna consists of clumps of low, twisted trees and shrubs dispersed over a sparse mantle of grasses and other herbaceous plants.



Figure 68. Campanha Gaúcha. Rio Ibirapuitã in flood.



Figure 69. Paraná pine forest. Pines form an open upper story, and various small trees and shrubs form the dense lower story.

d. Land Use

Land use varies considerably within the subregion. Tropical crops, such as coffee, cotton, sugarcane, and citrus fruits are grown commercially in São Paulo and in parts of northern Paraná (see Figure 71) and crops that can withstand light frosts, such as wheat, barley, and potatoes, are grown in the southern part of the subregion. In São Paulo commercial crops are generally grown on large plantations; in the southern states they are grown on small to medium-sized land holdings. Mixed farming is common in parts of eastern São Paulo on former coffee lands exhausted from extended one-crop farming. On these lands dairying is practiced in conjunction with the cultivation of various cash and subsistence crops. Maize, rice, and manioc are subsistence crops cultivated throughout the subregion. In many areas of the southern part of the subregion hogs, fattened on maize, are produced in conjunction with subsistence farming. Cattle grazing is common throughout. The fattening of cattle on improved pastures is characteristic of São Paulo, and the grazing of cattle on natural grasslands is more characteristic of the southern states (see Figure 72).

Industry is concentrated mainly within the greater São Paulo urban area and in cities located along the fall line separating the first and second segments of the plateau in the state of São Paulo.

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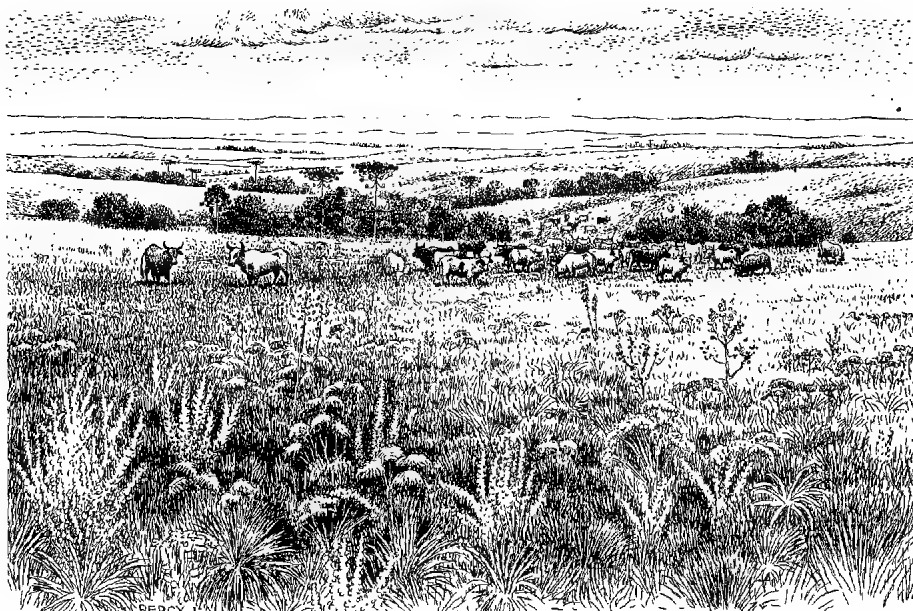


Figure 70. The Campos de Guarapuava. One of several grassland areas on the highest elevations of the Third Plateau.



Figure 71. Citrus plantation on Second Plateau near Campinas, São Paulo.

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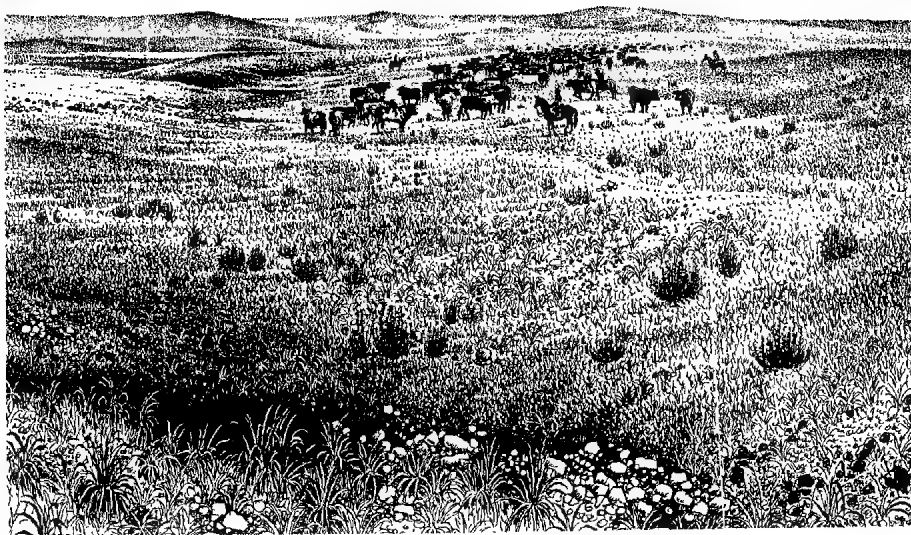


Figure 72. Range cattle on prairie grasslands of Campanha Gaúcha.



Figure 73. Lines of cliffs separating different surface levels on Southern Plateau. These sandstone cliffs are at Vila Velha, Paraná.

S-E-C-R-E-T

S-E-C-R-E-T



Figure 74. Steep, forested slope of Great Escarpment northwest of Santos.

Figure 75. Coastal lowland near Santos viewed from Great Escarpment.



S-E-C-R-E-T

3. Eastern Slope

a. Terrain and Drainage

The Eastern Slope Subregion includes the dissected eastern edge of the Southern Plateau and the coastal zone situated at its base. The subregion ranges in width from a minimum of about 5 miles in eastern São Paulo to a maximum of about 250 miles in southern Rio Grande do Sul. Its western boundary is the water divide separating rivers that drain eastward directly to the Atlantic Ocean from those draining westward into the Paraná - Uruguai drainage system. The Great Escarpment, which marks the edge of the plateau along most of its extent, appears from the coast as a formidable mountain range rising sharply 2,000 to 6,000 feet above the coastal lowland (see Figures 74 and 75). Various local names are applied to the different segments of the range -- the Serra do Mar, the Serra do Paranapiacaba, and the Serra Geral (see Figure 76). This mountain facade has been breached by two rivers, the Rio Ribeira de Iguape and the Rio Itajaí, which have carved out rugged upper basins in back of the facade (see Figure 77). In southern Rio Grande do Sul the Great Escarpment curves abruptly inland, and the subregion widens to encompass a broad central lowland



Figure 76. Serra do Paranapiacaba viewed from Ribeira de Iguape Basin.

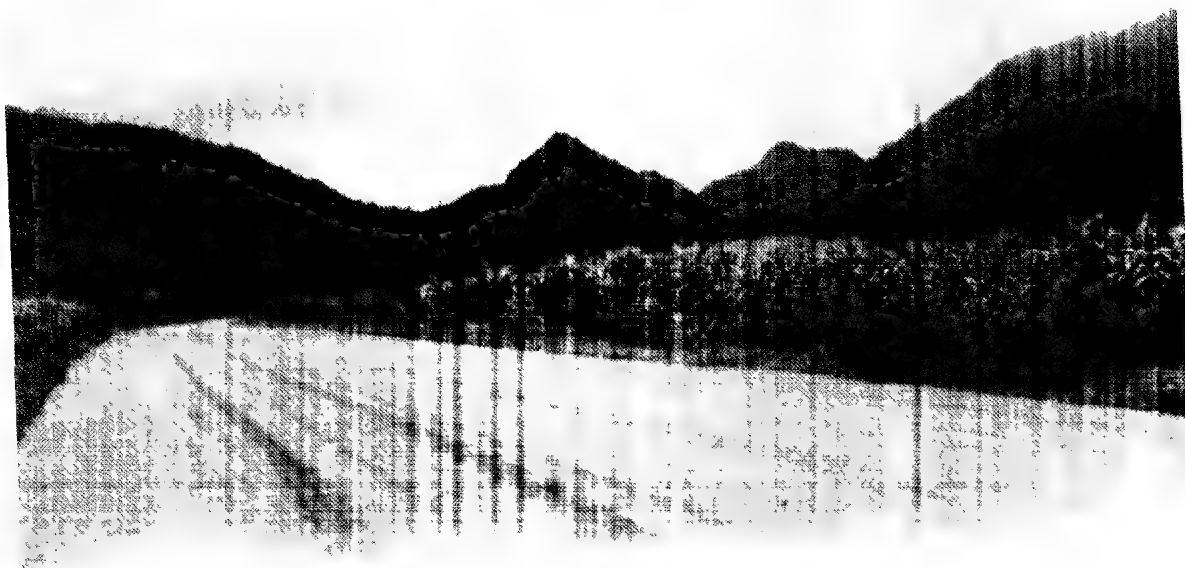


Figure 77. Steep hills along segment of Itajaí Basin.

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(the Jacuí Valley), a hill zone in the southeastern part of the state, and a broad coastal plain rimmed by extensive lagoons and a long barrier island.

The streams of the subregion are perennial. They descend the slopes of the Great Escarpment to the narrow coastal lowland via precipitous courses marked with numerous falls and rapids. Extensive areas of marsh and swamp border their meandering courses near the coast. The stream network of southern Rio Grande do Sul differs from that in the rest of the subregion. There the principal streams -- the Rio Jacuí and Rio Camaquã -- have longer courses and empty into the coastal lagoons rather than directly into the ocean. The flow of streams descending the Great Escarpment, always swift, is frequently torrential during the rainy season. On the coastal lowland at the foot of the escarpment these streams are generally sluggish except at flood stage. The period of high water occurs from November or December through April or May in the northern part of the subregion, and from May to September in the southern part. Two periods of high water occur on some streams in the transition zone in Santa Catarina and northern Rio Grande do Sul.

b. Climate

The climate of the subregion is humid subtropical except for an area of superhumid tropical climate along the coast of São Paulo. There is no distinct dry season in this subregion.

The rainfall exceeds 60 inches along most parts of the Eastern Slope southward as far as Florianópolis, Santa Catarina. The amount of rainfall increases with elevation, and exposed locations on the upper slopes of this sector receive more than 120 inches. From Florianópolis southward the rainfall decreases from 60 inches to 46 inches near the Uruguay border. It increases inland to between 50 and 60 inches on the central lowland and southeastern hills of Rio Grande do Sul. The seasonality of rainfall varies within the subregion. Autumn-winter rainfall predominates in Rio Grande do Sul, but a summer maximum occurs in the rest of the subregion. Some snow falls in winter on the south slope of the Serra Geral and in the southeastern hills.

The incidence of dense fog and low clouds is relatively high, particularly along the Great Escarpment, with the highest frequency being from April through August.

The predominant winds in the northern half of the subregion are from the southerly quadrants. In the southern half

of the subregion the northeast wind is dominant, although it is interrupted periodically by southeasterly and westerly winds. Gale winds seldom blow.

The mean annual temperature increases from south to north and from the summit of the Great Escarpment to the coastal lowland. Along the coastal lowland it ranges from about 62°F at the southern extremity to 72°F at the northern extremity. Along the summit of the escarpment it ranges from 60°F to 68°F. The mean minimum temperature ranges from 55°F to 64°F on the lowlands and from 50°F to 57°F on the escarpment. Similarly, the mean maximum temperature ranges from 71°F to 82°F on the lowlands and from 68°F to 78°F on the escarpment.

Frosts occur in southern Rio Grande do Sul and at higher elevations throughout the subregion.

c. Vegetation

The vegetation consists of coastal rain forest, a coastal complex of mangrove and beach vegetation, and a zone of prairie grassland in southern Rio Grande do Sul.

Luxuriant coastal rain forest covers the steep slopes of the Great Escarpment, as well as parts of the coastal lowland. The forest is almost as rich and varied in composition as the Amazonian rain forest. Lianas and epiphytes are common. The trees are reduced in size and somewhat deformed in appearance at the higher elevations. Mosses, lichens, and epiphytes are very abundant at these elevations due to the high frequency of rain, mist, and fog.

The southern slope of the Serra Geral has been mostly deforested, except for the highest and steepest slopes; second-growth forest in various stages of growth is interspersed among cultivated fields and pastures.

Along sandy coasts a thin cover of grasses and creeping plants extends over the inner margin of the beaches and on low dunes. On the higher dunes and on beach ridge plains the vegetation consists of a dense tangled growth of stunted trees, thorny bushes, and cactuses. Mangroves reach their southern limit along the coast near the Paraná - Santa Catarina border. They fringe the shallow parts of bays and river mouths and frequently extend several miles inland along the tidal reaches of rivers (see Figure 78).

Prairie grassland predominates on the central lowland and in the southeastern hills of Rio Grande do Sul, although

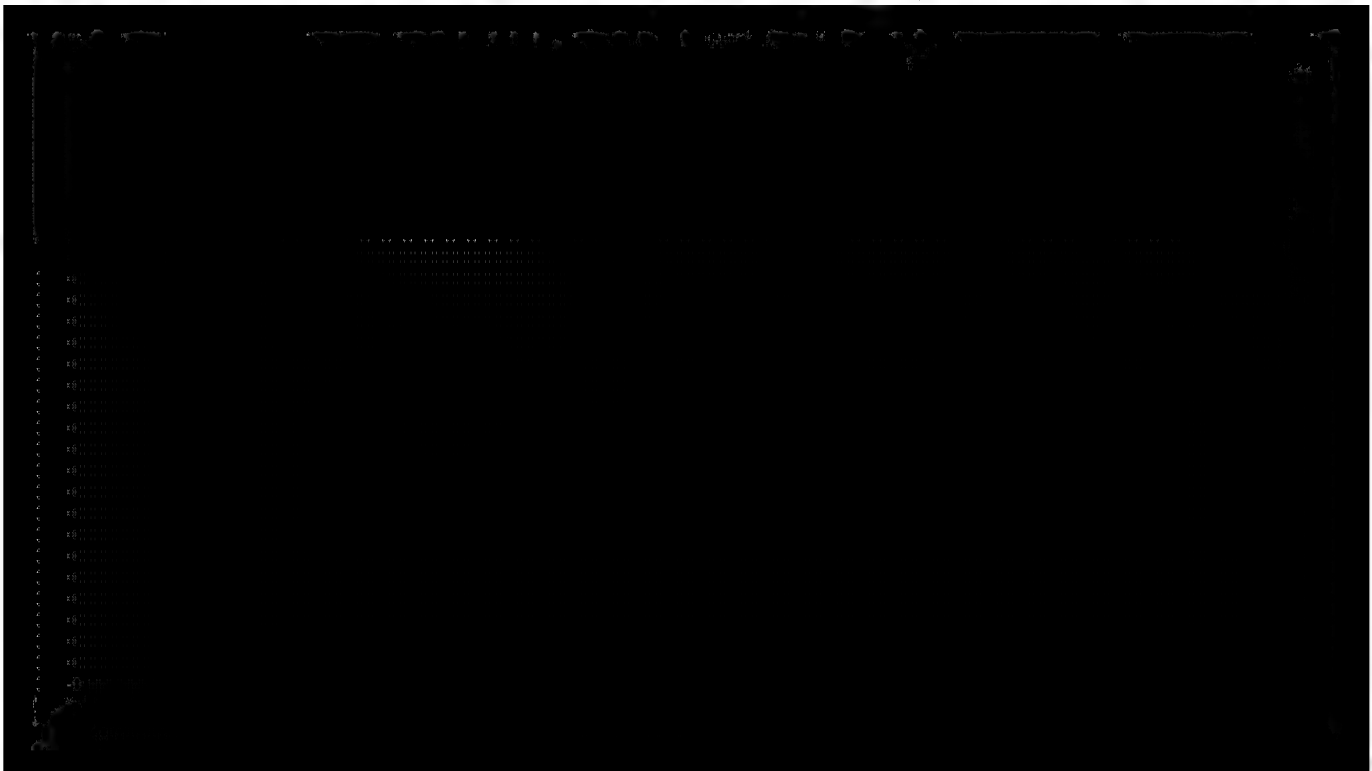
tropical semideciduous forest covers the summits of the highest hills. These forest stands are lower and much less luxuriant than the stands of coastal rain forest characteristic of the Great Escarpment.

d. Land Use

Primitive subsistence farming and firewood extraction are carried on in some parts of the Great Escarpment. Hogs, fattened on maize, and various subsistence crops are raised in the Ribeira de Iguape and the Itajaí river basins and along the southern slope of the Serra Geral (see Figure 79). Along the coast in the northern part of the subregion the population is centered primarily at the ports, and some fishing villages are dispersed along the shore. Along the more densely populated Santa Catarina coast, coffee and bananas are grown on the lower hill slopes, and sugarcane and paddy rice are grown along the river flood plains (see Figure 80). Livestock grazing is the principal activity in the southeastern hills and on the central lowland of Rio Grande do Sul, although paddy rice is raised along the Rio Jacuí flood plain and on the coastal plain along the west side of Lagoa dos Patos (see Figure 81).

Several coal mines are located in the foothills of the Serra Geral in southern Santa Catarina and on the central lowland of Rio Grande do Sul, near São Jerônimo.

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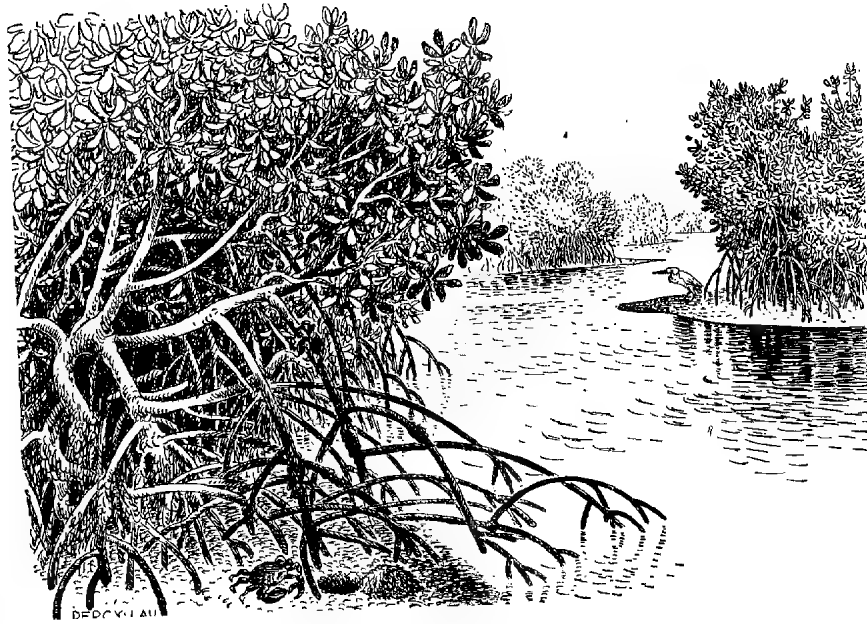


Figure 78. Mangroves. They extend along the tidal reaches of rivers and fringe the shallow parts of bays.



Figure 79. Small farm on southern slope of Serra Geral, Rio Grande do Sul.

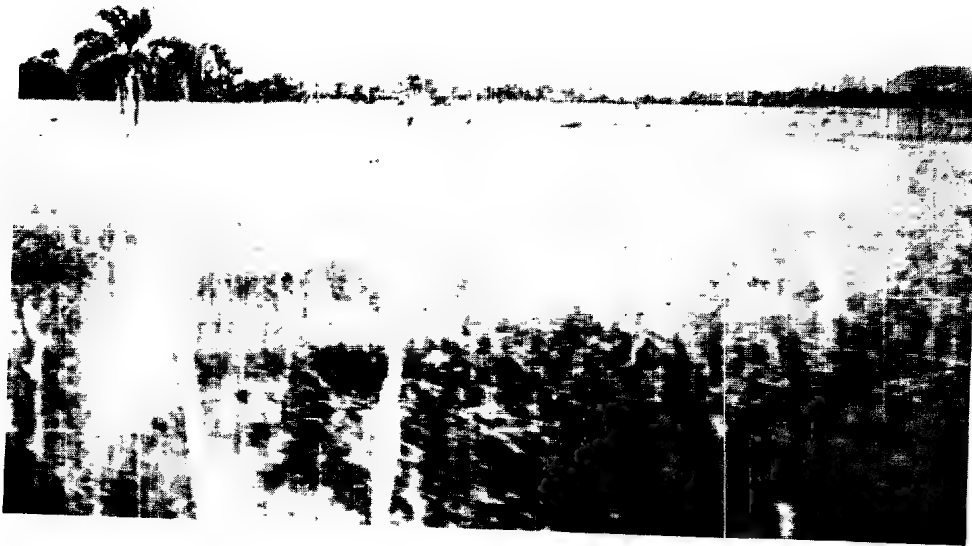
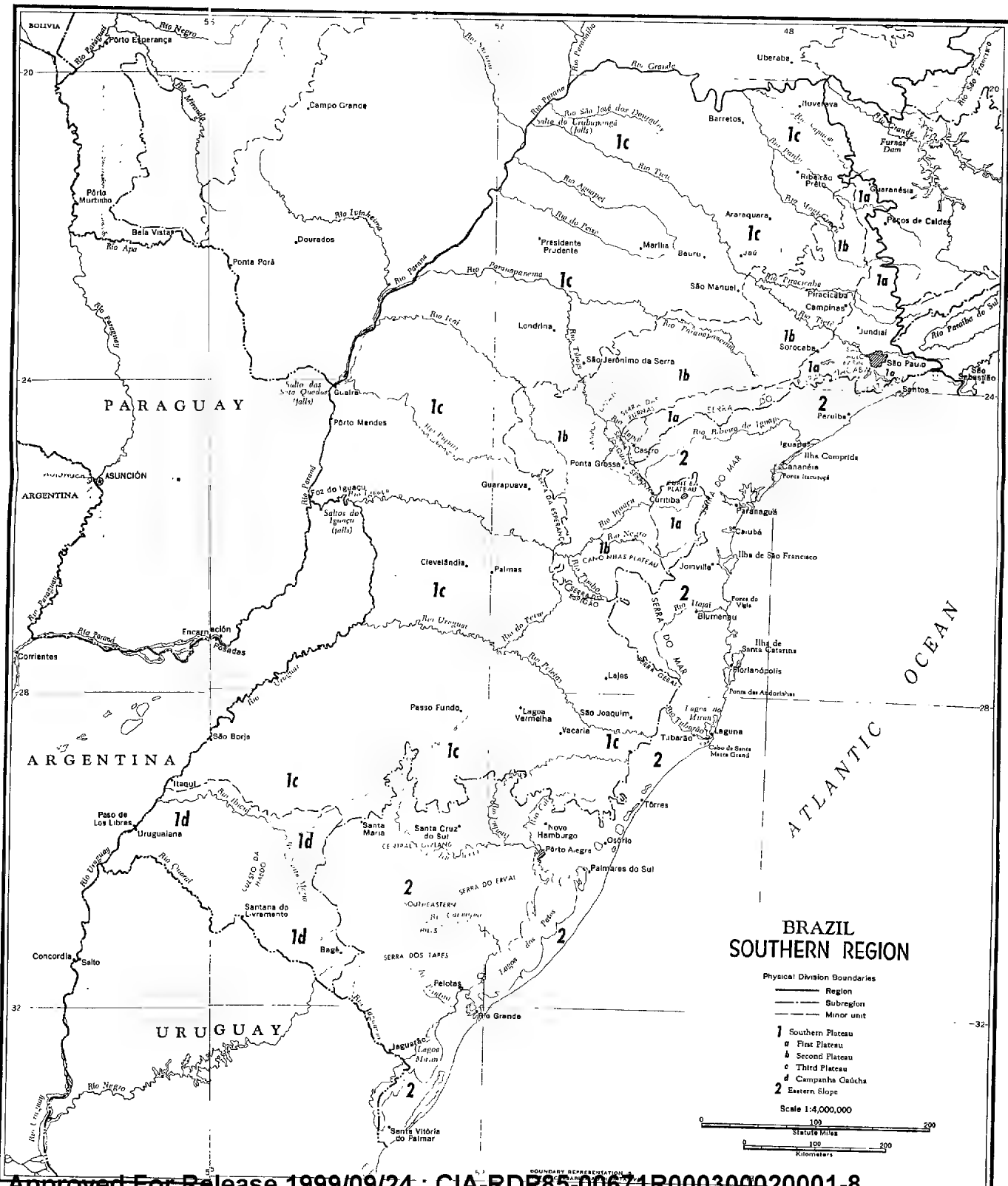


Figure 80. Ricefields on Santa Catarina coastal plain.



Figure 81. Harvesting rice on central lowland of Rio Grande do Sul, near Pôrto Alegre.



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S-E-C-R-E-T

Gazetteer

<u>Place Name</u>	<u>Coordinates</u>
Alcantilados Plateau	17°00'S 54°00'W
Amazon River	00°10'S 49°00'W
Bahia de São Marcos	02°36'S 44°28'W
Bahian Plateau	14°40'S 40°30'W
Baía de Marajó	01°00'S 48°30'W
Barbacena	21°14'S 43°46'W
Barra do Corda	05°30'S 45°15'W
Belo Horizonte	19°55'S 43°56'W
Borborema Plateau	07°00'S 37°00'W
Bragança	01°03'S 46°46'W
Brasília	15°47'S 47°55'W
Campanha Gaúcha	30°00'S 56°00'W
Campos do Jordão	22°44'S 45°35'W
Chapada das Mangabeiras	10°15'S 45°45'W
Chapada Diamantina	11°30'S 41°15'W
Chapada do Araripe	07°20'S 40°00'W
Conselheiro Lafaiete	20°40'S 43°48'W
Corumbá	19°01'S 57°39'W
Cuiabá	15°35'S 56°05'W
Espigão Mestre	14°00'S 46°10'W
Florianópolis	27°35'S 48°34'W
Furnas Dam	20°40'S 46°20'W
Furnas Plateau	17°00'S 54°40'W

S-E-C-R-E-T

SECRET

<u>Place Name</u>	<u>Coordinates</u>
Goiás	15°56'S 50°08'W
Guaíra	24°04'S 54°15'W
Ilha de Marajó	01°00'S 49°30'W
Itabirito	20°15'S 43°48'W
Lago Grande Do Curuaí	02°15'S 55°20'W
Lagoa dos Patos	31°06'S 51°15'W
Lagoa Mirim	32°45'S 52°50'W
Macapá	00°02'N 51°03'W
Manaus	03°08'S 60°01'W
Mato Grosso de Goiás	16°30'S 49°30'W
Natal	05°47'S 35°13'W
Ouro Preto	20°23'S 43°30'W
Paraguay River	27°18'S 58°38'W
Paulo Afonso	09°24'S 38°13'W
Pelotas	31°46'S 52°20'W
Pico da Bandeira	20°26'S 41°47'W
Priapora	17°21'S 44°56'W
Pôrto Alegre	30°04'S 51°11'W
Pôrto Esperança	19°37'S 57°27'W
Rio Araguaia	05°21'S 48°41'W
Rio Branco	01°24'S 61°51'W
Rio Camaquã	31°17'S 51°47'W
Rio Corrente	13°08'S 43°28'W
Rio Cuiabá	17°05'S 56°36'W
Rio das Mortes	11°45'S 50°44'W

SECRET

S-E-C-R-E-T

<u>Place Name</u>	<u>Coordinates</u>
Rio das Mortes Plateau	15°00'S 54°00'W
Rio das Velhas	17°13'S 44°49'W
Rio de Janeiro	22°54'S 43°14'W
Rio Doce	19°37'S 39°49'W
Rio Grande	11°05'S 43°09'W
Rio Grande	20°06'S 51°04'W
Rio Grande	32°02'S 52°05'W
Rio Itajaí	26°54'S 48°33'W
Rio Itapicuru	02°52'S 44°12'W
Rio Itapicuru	11°47'S 37°32'W
Rio Jacuí	30°02'S 51°15'W
Rio Jequitinhonha	15°51'S 38°53'W
Rio Juruena	07°20'S 58°03'W
Rio Madeira	03°22'S 58°45'W
Rio Mearim	03°04'S 44°35'W
Rio Negro	03°08'S 59°55'W
Rio Negro	19°13'S 57°17'W
Rio Paracatu	16°35'S 45°06'W
Rio Paraguaçu	12°45'S 38°54'W
Rio Paraíba do Sul	21°37'S 41°03'W
Rio Paraná	33°43'S 58°17'W
Rio Parnaíba	03°00'S 41°50'W
Rio Ribeira de Iguape	24°40'S 47°24'W
Rio São Francisco	10°30'S 36°24'W

S-E-C-R-E-T

<u>Place Name</u>	<u>Coordinates</u>
Rio Sapucaí	20°43'S 46°08'W
Rio Teles Pires	07°21'S 58°03'W
Rio Tocantins	01°45'S 49°10'W
Rio Uruguai	34°12'S 58°18'W
Rio Xingu	01°30'S 51°53'W
Salto das Sete Quedas	24°02'S 54°16'W
Salto do Urubupungá	20°36'S 51°33'W
Salvador	12°59'S 38°31'W
São Paulo	23°32'S 46°37'W
Serra da Bodoquena	21°00'S 56°50'W
Serra da Farinha	08°42'S 41°21'W
Serra da Ibiapaba	04°00'S 41°00'W
Serra da Mantiqueira	22°00'S 44°45'W
Serra das Araras	16°00'S 57°25'W
Serra do Caparaó	20°22'S 41°48'W
Serra do Espinhaço	17°30'S 43°30'W
Serra do Mar	23°00'S 44°50'W
Serra do Paranapiacaba	24°00'S 47°50'W
Serra do Urucum	19°13'S 57°33'W
Serra dos Aimorés	19°00'S 41°00'W
Serra dos Cariris Velhos	07°30'S 37°00'W
Serra Geral	27°40'S 49°40'W
Serra Tabatinga	10°25'S 44°00'W
Southern Minas Plateau	21°30'S 45°00'W

S-E-C-R-E-T

<u>Place Name</u>	<u>Coordinates</u>
Três Marias Dam	18°11'S 45°15'W
Triângulo Mineiro	19°00'S 48°00'W
Zona da Mata of Minas Gerais	21°30'S 43°00'W

S-E-C-R-E-T

GLOSSARY

<u>agreste</u>	Scrub woodland; a type of natural vegetation transitional in nature between tropical forest and thorny scrub.
barrier island	An elongated island comprised of multiple beach ridges extending generally parallel to the coast but separated from the coast by a lagoon, bay, or marsh; the island commonly has dunes and narrow, elongated swampy areas.
beach ridge	A ridge of sand and gravel built up along the beach by wave action.
beach ridge plain (<u>restinga</u>)	A plain consisting of parallel lines of beach ridges separated by narrow swales.
<u>caatinga</u>	Thorny scrub vegetation; a type of natural vegetation characteristic of the semiarid Sertão.
<u>campo limpo</u>	"Clean" savanna; open grassland devoid of trees.
<u>campo cerrado</u>	See woodland savanna.
<u>chapada</u>	A tableland, generally steep-sided and more than 600 meters (about 2,000 feet) high.
cuesta	A sloping plain or tilted tableland having a scarp face at its raised end and a gentle back slope.
epiphyte	An air plant; a nonparasitic plant that grows on another plant but gets its nourishment from the air.
frontal rainfall	Rainfall induced as the result of the interaction of dissimilar masses or currents of air brought together along a frontal surface.

gallery forest Bands of forest occurring along both banks of a river in what is otherwise a region of open country.

igarapé A canoe passage; a seasonal, narrow waterway occurring on a flood plain and often parallel to the main river (Northern Region).

intermittent stream A stream that flows part of the year and is dry the remainder of the year.

liana A woody, climbing, tropical vine that roots in the ground; occurs entwined snakelike about tree trunks and, often, entwined in the tree crowns as well; flexible stems hang down from the crowns like ropes.

mangrove swamp A type of swamp formed on tidal land consisting primarily of species of mangrove; the common or red mangrove has stilt roots; the overlapping roots of these trees are covered by water at high tide but rise above the mudflats at low tide forming a "king-size jungle gym".

mesa A flat-topped, steep-sided hill or mountain of smaller extent than a plateau.

natural levee The low ridge sometimes built up by streams on their flood plains on either side of their channels.

nearshore approach The sea area which extends from the 30-foot (5-fathom) depth contour to the low-water line of the beach.

offshore approach The sea area which extends from approximately the 600-foot (100-fathom) depth contour to the 30-foot depth contour.

<u>planalto</u>	Plateau.
raised beach	A former beach, now elevated above high-water level.
<u>restinga</u>	See beach ridge plain.
savanna	A broad term applied to a tropical or subtropical grassland containing scattered trees.
slough	A marshy place lying in a local depression of dry land.
swale	A shallow, elongated depression that is at least seasonally wet or marshy.
<u>serra</u>	Mountain range; applied locally to any topographic feature exhibiting strong relative relief.
<u>sertão; Sertão;</u> <u>sertões</u> (pl.)	Backland or remote interior; a subregion comprising the semiarid interior of the Northeastern Region.
slash-and-burn cultivation	Shifting cultivation; a form of agriculture in which fields are cleared by burning and are cultivated for a short period of years until the soil shows signs of exhaustion, after which the land is left to the natural vegetation while cultivation is carried on at a new site.
<u>tabuleiro</u>	A low, steep-sided tableland.
<u>terra firme</u>	Firm ground; land not subject to inundation.
tropical semideciduous forest	Tropical forest composed mostly of broadleaf evergreen species, but with some broadleaf deciduous species.
woodland savanna (<u>campo cerrado</u>)	A type of savanna vegetation consisting of grassland with parklike stands of low trees and shrubs; grassland with scattered thickets of deciduous scrub forest.

xerophytic

Drought resistant; capable of thriving in a hot, dry climate, as certain plants and animals.

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IV. Population

A. General

1. Size and Growth

More than half of all South Americans live in Brazil, where the population in 1960 numbered 70,967,185; by July 1966, official estimates set the total at 84,679,000. This increase reflects a phenomenal rate of growth -- 3.1 percent annually between 1950 and 1960 -- ranking Brazil first among the major nations of the world. Unless birth rates are substantially lowered, there will be more than 120 million people in Brazil by 1980.

Because Brazil is so large (3,286,000 square miles -- the fifth largest country in the world) and has vast areas that are virtually uninhabited, the overall density of population is only 25 persons per square mile. As in all Latin American countries, however, actual densities vary greatly from one region to another. According to official computations, the density of population ranges from less than 0.5 per square mile in parts of the Amazon Basin to 130 per square mile for the state of Rio de Janeiro and to 3,927 per square mile for the state of Guanabara -- the urban complex that was the Federal District and national capital until 1960. See Map 5735 for density patterns in 1950, which have remained essentially the same to this date.

Except in the South, most of Brazil's population lives within 300 miles of the coast, reflecting the historic settlement of the country. Nearly 45 percent of the population is concentrated in the six southern and southeastern states on a tenth of the national territory. More than 18 percent of all Brazilians live in the state of Sao Paulo alone. The East and Northeast, with approximately 20 and 25 percent of the population, respectively, are also densely populated. The remaining 10 percent are widely scattered across the vast sertões of the interior and along the waterways in the endless forests of the Amazon Basin. See Table 1 for population by state and territory in 1960 and 1966 and for the increase of population (in percent) during the period 1950 to 1960.

2. Distribution

Brazil has always been a predominantly rural country, with agriculture the mainstay of its economy. The rural character of the country is much more pronounced than the rural-to-urban settlement ratios -- 55:45 in 1960 and 64:36

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in 1950 -- indicate. Many very small and primitive towns are counted in the statistics as partially urban simply because they are município or distrito seats. True urban areas are relatively few; only 17 cities have a population of over 150,000 (see Table 2), and only 51 others have more than 50,000. Most cities are not effectively connected with the rural communities by modern transportation and communications facilities. They have little cultural impact beyond their immediate surroundings, and in general they have tended to grow and function quite independently of rural areas. Consequently, the rural dweller has lived apart, largely unaware of the city, and has clung to established and traditional ways. The homogenization of these widely divergent worlds has now begun with the migration of rural dwellers to the cities, the development of new educational, health, and colonization programs, and an awakening stemming from the cumulative effects of modern means of communication.

3. Mobility

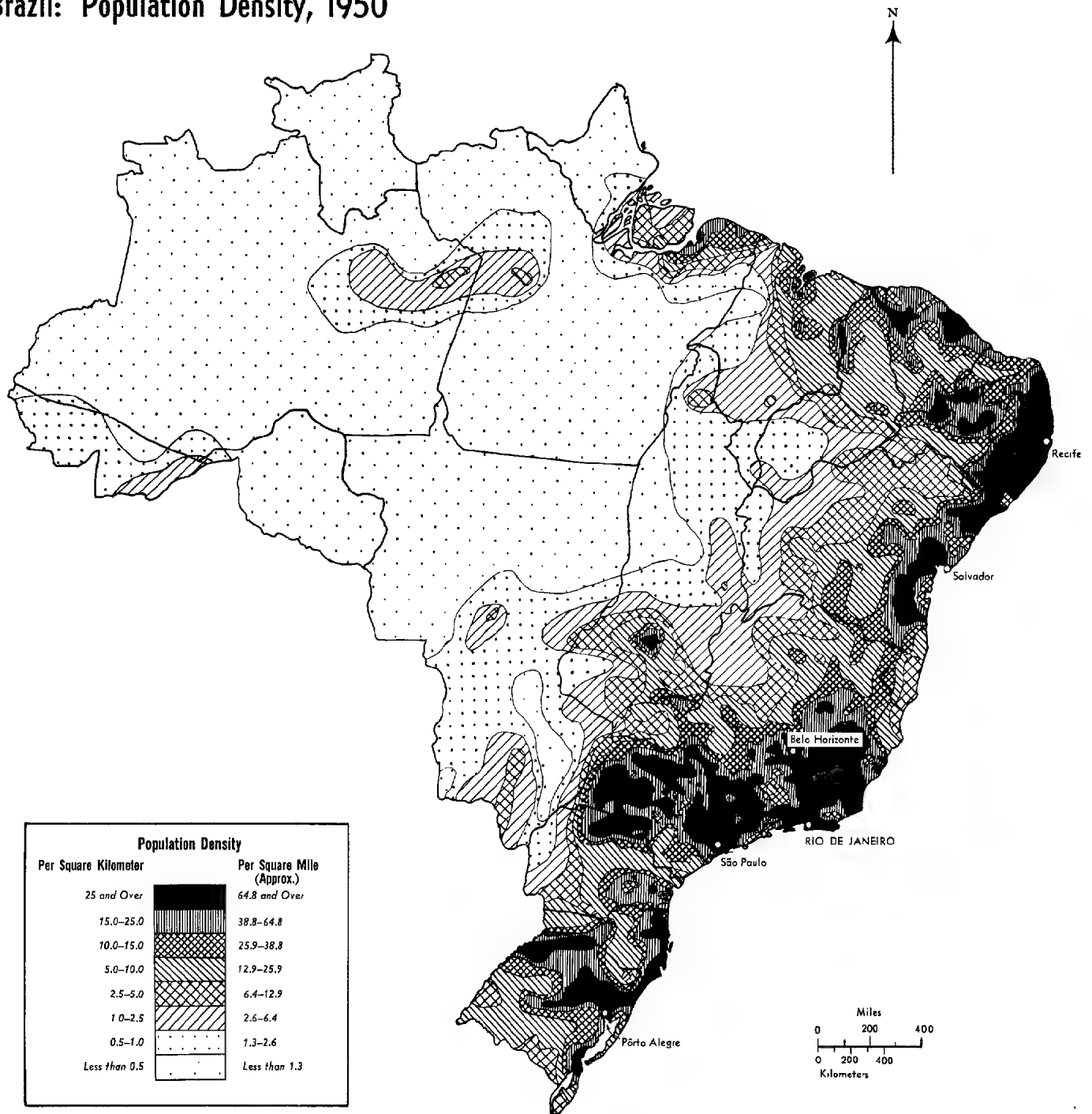
Internal migration is considered by many to be a Brazilian national trait; the economic expansion of the country during the 18th and 19th centuries can be attributed, in large measure, to the speculative daring of the restless settlers who welcomed new ventures. Willingness to migrate to new areas or to new jobs -- especially among the lower rural classes -- is so readily apparent that foreign observers typically comment on the instability of the Brazilian populace. Migration is the result of: (1) the system of slash-and-burn agriculture, (2) the seasonal movement of workers to the cotton, sugarcane, and cacao areas along the eastern coast, (3) the flight of people from catastrophic droughts which periodically reduce the Northeast to a dust bowl, (4) the opening up of new agricultural frontiers, most recently in western São Paulo, northern Paraná, and the newly developing areas around Brasília, and (5) rural-urban transfers, in which people search better opportunities than the countryside provides, especially in schooling for children. Most notable of all such movements has been the influx of hundreds of thousands of workers into the state of São Paulo, first as agricultural workers and in more recent years to take city jobs.

4. Settlement Patterns

Settlement patterns in Brazil have for centuries reflected the rural, agricultural, and extractive economy which has prevailed, essentially unchanged, even to the present. A journey inland today can be likened to a trip into the past,

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Brazil: Population Density, 1950



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in which two decades are left behind for each day of travel. Modern communities are largely a phenomenon of the past few decades.

Three distinctive settlement patterns prevail: estate villages, line villages, and isolated farmsteads. Villages occupied by independent freeholders are not as common in Brazil as in most countries, nor are they as common as a passing observer might assume.

The estate village accommodates large groups of workers on the coffee fazendas, sugar usinas (mills), large cotton plantations, and to a lesser extent the extensive cattle ranches. Typically the casa grande of the landlord dominates the scene. Nearby are all of the crop-processing facilities as well as such essentials as a chapel, commissary, school, and perhaps infirmary. The workers' houses surround this complex. On very large estates there may be more than one such village, but all are subordinate to the property management.

The line village, widely distributed in Brazil, consists of long narrow properties on which the dwellings face a common road or river. Line villages have been characteristic of many colonization schemes, but they also have been developed independently -- in thousands of small cacao holdings along the coast from Ceará to Bahia and in the many riverine settlements of the São Francisco and Amazon basins.

The scattered farmstead is the third type of settlement in Brazil. Usually it is associated with areas of poor soil and is sandwiched between large landholdings. Thatched huts are typical. Many owners of these small farms work for hire on the remote extremities of large estates; others are independent, wresting a bare existence from the marginal soils. The mobility of these people is notable, and every year millions of them move to some new area, taking along little more than the skills required to clear a new plot and erect another wattle-and-daub hut.

5. Demographic Terminology

Hundreds of terms are used to designate different elements of Brazilian society. The more widely used of these terms -- knowledge of which would be useful to non-Brazilians -- are listed below along with translations. In certain instances the area in which usage prevails is also indicated.

S-E-C-R-E-T

a. Color

Amarelo	Yellow
Branco	White
Moreno	Dark skinned
Paraavasco	Brown; dark mulatto
Parao	Brown; official census term for mulattoes, mestizos, and Indians
Prêto	Black
Sarará	Light mulatto

b. Race

Cafús, Cafuso, Caboré	Black/Indian
Cariboca	White/Indian
Creulo, Creole	Black (Negro)
Homen de cor	Colored man
Mameluco	White/Indian
Mulato	Mulatto; white/black
Mestiço	Mixed; usually white/Indian

c. Country people of low status

Bruaqueira	Minas Gerais
Caboclo	Widely used; originally White/Indian halfbreed
Caiçara	Along São Paulo coast; also term for low-class fisherman
Caipira	Widely used for uncouth rural dweller; derogatory
Cangussú	São Paulo

Capuava	Minas Gerais and Bahia
Casaca	Piauí
Casacudo	Along Rio São Francisco
Corumba	In northeast
Guasca	Rio Grande do Sul
Homen de campo	Widely used; general term
Mambira	Rio Grande do Sul
Mandioqueiro	Minas Gerais
Plóca	Widely used
Praiano	Along seacoast
Queijeiro	Minas Gerais
Tabaréu	Widely used; like caboclo and caipira

d. Farm People

Agregado	Agricultural laborer who lives on the estate
Camarada	Hired farmer who does not live on the estate
Colono	Tenant farmer on 1-year contract
Foreiro	Squatter
Gaúcho	Rio Grande do Sul cowboy
Vaqueiro	Cowboy
Intrudor	Squatter
Morador	Squatter
Parceiro	Landless farmer, share-cropper

Posseiro	Squatter
Roceiro	Slash-and-burn farmer
Sitiante	Independent rural worker
e. <u>Miscellaneous</u>	
Bandeirante	Frontiersman
Cangaceiro	Bandit in the sertão
Carioca	Resident of the city of Rio de Janeiro
Chapadeiro	Plainsman
Garimpeiro	Diamond searcher in streams
Machadeiro	Woodsman, rubber gatherer
Mascato	Ambulant peddler
Matuto	Backwoodsman
Seringueiro	Rubber tapper
Sertanejo	Common man in the sertão
Sertanista	Upper class person in the sertão; also synonym for bandeirante

B. Composition

1. Color and Race

Brazil stands first among the countries of the world as an effective "melting pot," a position it has continuously held from the first days of Portuguese colonization. For 400 years red, white, and black people were thrown into close physical and social contact, and in the last 100 years millions of Europeans and many thousands of Japanese have become a part of the composite whole. The resultant mixture of racial strains defies analysis, and in Brazil color rather than race determines the categories into which people are grouped. According to the 1950 census the population was enumerated as follows:

	<u>Number</u>	<u>Percent of Total</u>
<u>Branços</u> (Whites)	32,027,661	61.7
<u>Prêtos</u> (Blacks)	5,692,657	11.0
<u>Amarelos</u> (Yellows)	329,092	0.6
<u>Pardos</u> (Mixed)	13,786,742	26.5
Undeclared	108,255	0.2

These data should be considered approximations, since there is no reasonable way to define color, especially in view of the prestige status attached to light skin. Thus, white probably should be considered "whitish," and black can be assumed to be undeniably black. The determination of the proper category for the many millions of persons in between is a subjective matter. Numerous terms are used locally in reference to the various hues of skin or to blood mixture (see list of terms, page 118). Pardo, as used by the census, is an unfortunately broad and meaningless term that includes not only all persons of mixed blood (excluding those claiming to be white) but also all pure Indians. The term prêto is applied to black-skinned people; "Negro" is used only in an academic sense in Brazil except when meant as a derogatory designation.

The prêtos are the descendants of the estimated 3 to 18 million Negro slaves brought from Africa in the 16th, 17th, and 18th centuries. Most of the slaves were either Bantus from the Congo and Mozambique or west African Sudanese from former French Soudan. The Sudanese were settled mainly in the area around Bahia, while the Bantus went to the area around Rio de Janeiro and to the Northeast. Over the centuries the two groups melded into one. The zone of greatest African influence in Brazil stretches from the state of Pernambuco southward along the coast to Rio de Janeiro and inland across Minas Gerais, southern Goiás, and northern São Paulo. Throughout this area, African traits have spread into local customs, language, food, music, folk tales, and religious cults.

2. Immigrants

Immigrants to Brazil make up only a small percentage of the national population, but despite minority status, they play a significant role in the economic and social makeup of the country. Approximately 5 million immigrants entered



Figure 82. Caboclo family in the North. These people live on a precarious subsistence level with few amenities.



Figure 83. Northeast caboclo family with its stock of farinha (manioc flour). The tipiti across the trough is used to squeeze poison juices from ground up manioc roots.



Figure 84. Gauchos examining prize bull at fair in Rio Grande do Sul.



Figure 85. Northeastern cattlemen typical of the dry sertões.



Figure 86. Fishermen and children on banks of Amazon at Santarém, Pará. Skins of various hues are characteristic of people along the lower Amazon. Note the variety of boats.

Brazil between 1884 and 1962, coming primarily from European countries. The greatest influx took place after the abolition of slavery in 1888 and prior to 1934 (see Table 3 for numbers of immigrants from major countries of origin). Since 1934 immigration has been controlled by a quota system based on 2 percent of the total previous immigration from each country.

Almost equal numbers of immigrants have come from Italy and Portugal, which have contributed more than 60 percent of the total. Spanish immigrants rank third (about 14 percent), followed by those from Japan (less than 5 percent). The yellow race is represented almost entirely by the Japanese who came in large numbers in the late 1920's and 1930's. Since World War II some 20,000 more have come. German immigration, amounting to roughly 200,000, is of primary significance because of its cultural impact on a sizable part of southern Brazil. The early German colonizers deliberately isolated themselves from other groups, reproduced very rapidly, and retained their language, customs, dress, types of housing, and attitudes to such an extent that nearby Brazilians appeared to be the strangers. Although this isolation has lessened in recent years, much of Rio Grande do Sul and Santa Catarina still has a German appearance.

São Paulo State has the greatest number of foreign settlers, it having been most successful in attracting agricultural colonists after the abolition of slavery. As of 1950, 56.6 percent of all immigrants lived within its confines. Immigrant groups included the Japanese, Italians, Spaniards, Germans, Dutch, Turks, Syrians, and Portuguese. The Federal District of that time ranked next with 17.2 percent of the total, followed by Rio Grande do Sul (6.4 percent), Paraná (6.3 percent), and the state of Rio de Janeiro (3.2 percent). These areas contained all of the nationalities resident in São Paulo as well as scattered groups of Poles. Small settlements of Spanish, Turkish, Japanese, and Italians were located in Mato Grosso, Minas Gerais, Espírito Santo, and Bahia, and the Japanese, Turks, and Portuguese had made their way into the Amazon Valley. The Northeast Region and most of the East and West-Central Regions have had little attraction for immigrants, and even today non-Brazilian types in these areas are considered outsiders.

3. Indigenous Indian Groups

Millions of Brazilians today can claim Indian blood as a result of 400 years of continuous fusion of Indian with Portuguese, and to a lesser extent, with Negro racial strains. In addition, innumerable cultural traits in modern Brazilian

life are identifiable as Indian in character. The strict use of the term "Indian," however, is limited to those groups in Brazil who think of themselves as Indians and who are considered so by others because of tenacious loyalty to their ethnic background. Such groups are located throughout Brazil, except in the densely populated parts of the South. In northeastern and southwestern Brazil nearly all of the Indian tribal groups have become acculturated to a great extent, but their core groups still retain their Indian identity.

Brazilian ethnologists estimate the total number of Indians in Brazil today to be somewhere between 65,000 and 100,000 -- a staggering decimation of the 1 to 2 million believed to have inhabited the area when the first Europeans came. The small number of remaining tribes would be of little relative consequence were it not for the fact that the great majority of them are the primary inhabitants of vast areas of the interior. Not only are they the most knowledgeable about these areas, but they also determine the degree to which outsiders may move about, develop extractive industries, or establish settlements. These tribes also constitute the best source of untapped labor in the remote areas. It is estimated that about 65 percent of the Indian population is located in Amazonia; 20 percent in Mato Grosso and northern Goiás; 8 percent in the South; and the remaining 7 percent in the East and Northeast.

It is impossible to determine exact population figures for specific groups (except in integrated communities), since census enumerators cannot reasonably contact those that are in remote areas. A 1957 study, however, estimated that approximately half of the Indian groups contain 250 persons or less; at least another third had between 250 and 2,000 persons each; and the remaining few groups may have numbered as many as 4,000 to 5,000 each. Sometimes groups may be further divided into small villages.

Estimates also were made to determine the amount of contact that exists between Indians and their Brazilian neighbors, that is, whether they are seldom or occasionally in contact, are permanently in contact, or have been essentially integrated as laborers into Brazilian settlements. Based on minimum numbers, it was calculated that at least 21,000 Indians remain isolated, having essentially no contact with outsiders, either because of the remote locations of their villages or because of their previously hostile and bloody conflicts with civilization; some 8,000 to 10,000 have only intermittent contact, because their lands, often economically

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marginal, have only recently been penetrated by Brazilians; approximately 13,500 have permanent contact with settlements in rural Brazil; and 24,500 are integrated as indigenous "islands" in the national populace -- such as in São Paulo State or in the Northeast.

At least 35 independent Indian languages, divided into more than 100 mutually unintelligible dialects, are spoken in Brazil. All stem primarily from six major linguistic stocks:

Tupi	Most widespread. Originally spoken along the coast and the Amazon Valley, it was adopted as the lingua franca during the first 200 years of colonization and is still used in remote areas.
Aruak	Spoken along the upper tributaries of the Amazon and in southern Mato Grosso.
Karib	Spoken north of the Amazon.
Jê	Spoken along the Xingu, the Araguaia, and the Tocantins rivers, and in the South.
Pano	Spoken along the upper tributaries of the Juruá and Purus rivers.
Xiriana	Spoken north of the Rio Negro.

Ordinarily Indians communicate with outsiders in Portuguese, which is also frequently used between tribes whose languages are unintelligible to each other. In the Northeast, where acculturation has existed the longest, most Indian groups speak Portuguese to the exclusion and loss of their own native tongues.

All Indian groups fall under the custody of the Indian Protective Service (Serviço de Proteção aos Índios -- SPI), established in 1910 and an autonomous federal agency under the Ministry of Agriculture since 1939. By the time of the inception of the SPI, Indian tribes were in danger of extinction. As the SPI began operations it faced several monumental tasks, including: (1) the pacification of belligerent tribes whose deep-seated hatred of the white man had generated savage and destructive attacks on outlying settlements; (2) the protection of Indians from unwarranted abuse, both in the appropriation of their lands and in the utilization of their

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labor, particularly in such economic ventures as the rubber "boom"; and (3) the education of Indians so that they might understand the advance of civilization and appreciate the ultimate goal of the government -- the assimilation and conversion of the Indian into productive citizenship.

The SPI can be credited with effecting a large number of peaceful adjustments between settlers and previously hostile Indians. It has established throughout the country more than 100 reservations (SPI posts) on which the Indians may adjust to "civilized" life. Nevertheless, many more reservations are needed. The SPI also assists with legislation, whenever possible, to solve the serious problems of land use and occupancy that still arise in remote areas.

Two other groups have done significant work with the Indians. Since World War II, Orlando Villas Boas -- a unique and dedicated Brazilian -- and his two brothers have worked in the area known as the Upper Xingu. In this area one of the world's most remarkable examples of intertribal acculturation among primitive peoples has taken place. Retreating from the pressures of early colonization on the north, east, and south, Indian groups from four linguistic stocks (Tupi, Aruak, Karib, and Jê) coincidentally converged into this region of central Brazil and evolved an amicable adaptation of cultural traits. The Villas Boas brothers have devoted their efforts to pacifying and protecting these tribes; through their efforts an 8,500 square-mile National Park (Parque Nacional do Xingu) was established in 1961. This park is a living museum of history and Indian culture wherein tribes can remain without threat to their survival and into which strangers cannot enter without hard-to-get permits. Some tribes outside the area, threatened with extinction, have elected to move in, and the Villas Boas brothers urge others to do the same.

The Summer Institute of Linguistics (SIL), also referred to as the Wycliffe Bible Translators, has also done notable work with the Indians. This organization of nondenominational linguists has as its worldwide objective the enscribing of previously unwritten languages, followed by translations of parts of the Bible. In Brazil SIL teams, each consisting of two women or a married couple, have worked with some 40 different tribes since 1956. Usually these teams live in a village for several months at a time. In 1964, at the request of the SPI, they surveyed most of Brazil's Indian tribes and provided data for a report that contains the most accurate and complete estimates of tribal locations, numbers, and linguistic families ever produced.

4. Indian Culture Areas

The immensity of the area over which these tribes are distributed (more than 2 million square miles), the high degree of intertribal acculturation that has occurred, and the small size of the individual groups make it difficult to summarize significant factors about the Indians if enumerated tribe by tribe. Consequently, they are presented according to a system of Culture Areas devised in the 1950's by the Brazilian ethnographer Galvão. The criteria used in determining these Culture Areas included geographical similarities, the integration of common cultural traits, and the degree of Indian contact with outsiders. Eleven such areas have been identified: seven in the tropical forests and grasslands of the Amazon Basin, three in the subtropical forests and Pantanal of southern and southwestern Brazil, and one in northeastern Brazil. See Map 57545 for the delineation of Culture Areas; the locations of individual groups, their numbers, and linguistic families; the locations of Summer Institute teams; and the areas in which hostile Indians live.

Table 4 summarizes for each Culture Area its geographical nature; the number of Indians in each linguistic family (including some besides the six major families); characteristic cultural traits such as occupations, type of rivercraft, type of house, and religious practices; and the level of contact and attitudes toward outsiders.

C. Language

Brazil is the only country in the Western Hemisphere in which Portuguese is the national language. Although it was the official language in the early days of colonization, the language of the street was the quickly adopted Tupi tongue of the coastal Indians which was energetically promoted as the lingua franca by Jesuit missionaries. Not until the Jesuits were expelled in 1759 did Portuguese become the commonly used language. Tupi and several other Indian languages are still used by the indigenous Indians, although all but the most isolated tribes speak Portuguese to a limited degree. The common use of Tupi left a permanent impression on the Brazilian language, especially in place names, topographic features, and the names of flora and fauna. Similarly, African Negroes have contributed words and phrases to the language of Brazil, as have European colonists through the past 100 years.

In 1943, Brazilian Portuguese was officially adopted by the government, with simplifications in spelling and differences

in usage from the original language. In spoken "Brazilian," variations in pronunciation and in slang reflect regional differences and cultural levels. Regional dialects are quickly identified by Brazilians just as Americans can deduce a person's native region by his speech. Final vowels are dropped in the North, natives of Rio de Janeiro tend to slur their words, and Bahians are frequently quite blunt. The spoken Portuguese of Brazil differs from that of Portugal much as the English of America differs from that of England.

The large numbers of Europeans who poured into Brazil in the late 1800's and early 1900's maintained their native languages in the isolated colonies they established. With the advent of World War I, attention was focused on the widespread use of German and Italian, especially in Brazil's remote colonial schools. Educational reforms were then instituted, and by 1938 it was required that all pupils study the Portuguese language and that all lessons be taught in Portuguese by Brazilian-born teachers. Immigrants are now expected to learn Portuguese as quickly as possible, and new colonies, institutions, businesses, and other establishments must bear Portuguese names. At least 30 percent of the population of all new colonies must be native-born or of Portuguese origin, and no other single nationality group may exceed 25 percent of the total. Such laws and the natural inclination of Brazilians to accept newcomers have promoted cultural assimilation. Only the Japanese tend to remain culturally consolidated, and even they use Portuguese in business transactions. Thus, few places can be found in Brazil where Portuguese is not spoken by nearly everyone.

D. Education

Educational standards throughout Brazil are deplorably low at all levels, and educational opportunities are inadequate except in the larger cities. As a consequence, the majority of the rural populace normally completes no more than 2 or 3 years of elementary school education. Travelers in some areas experience difficulty in finding persons who can read or write.

Approximately 45 percent of Brazil's population was defined as illiterate in 1962. The actual amount of illiteracy was undoubtedly much higher, however, since literacy was determined by the ability to sign one's name and an oral declaration of reading ability. Illiteracy is higher among adult females than males, but it is about the same among female and male children. It varies greatly among age groups, directly reflecting the lack of basic schooling in the past.

Thus, illiteracy among people over 50 years of age is much higher than it is among younger people who have had better educational opportunities. Far more people are illiterate in the northeastern states (70 percent) than in the southern and southeastern states (30 percent), and the percentage of illiterates among rural dwellers is three times as high as it is among their urban counterparts. Racial differences are also notable. Less than 20 percent of persons in the yellow race (mostly Japanese) and 34 percent of those classed as white are illiterate, while 69 percent of the pardos (mestizos, mulattoes, and Indians) and 73 percent of the Negroes are illiterate.

The school system includes a free elementary school, in which 4 years are theoretically compulsory and 3 more years are encouraged; academic and vocational secondary schools, which offer 4 years of ginásio (roughly junior high school) followed by 3 years of colégio (senior high school); and a number of universities with courses lasting from 1 to 6 years. Despite official programs to promote education and to reduce illiteracy to 5 percent of the population by the year 2000, the rapid increase of the population makes progress toward these goals difficult. The situation today is only slightly better than it was in 1950, when it was determined that 82 percent of the population over 10 years of age had not completed any level in the school system.

Of those completing elementary school, less than 15 percent were pardos or Negroes. This is explained, in part, by the distribution of existing schools, most of which are in urban areas. In the rural areas, where the population consists largely of pardos and Negroes, schools are fewer and the percentage of graduates is very low. In 1960, of the 2,764 municípios in Brazil, only 275 had secondary schools through the colégio level and 1,359 had no schools beyond the elementary level. The schools (escolas isoladas) in many remote areas consist of one ungraded classroom, with an inadequately trained teacher and little if any equipment for the motley assortment of pupils who live within walking distance.

The school dropout (evasão) is a serious educational problem. A 1960 study indicated that 50 percent of Brazilian children quit school after 1 year or less of elementary education, and less than 5 percent complete 6 years. Although school conditions are poor in some of the large cities, instruction is better and programs are more organized than in the small towns. In many small communities good teachers are hard to find or keep, and impractical curriculums make

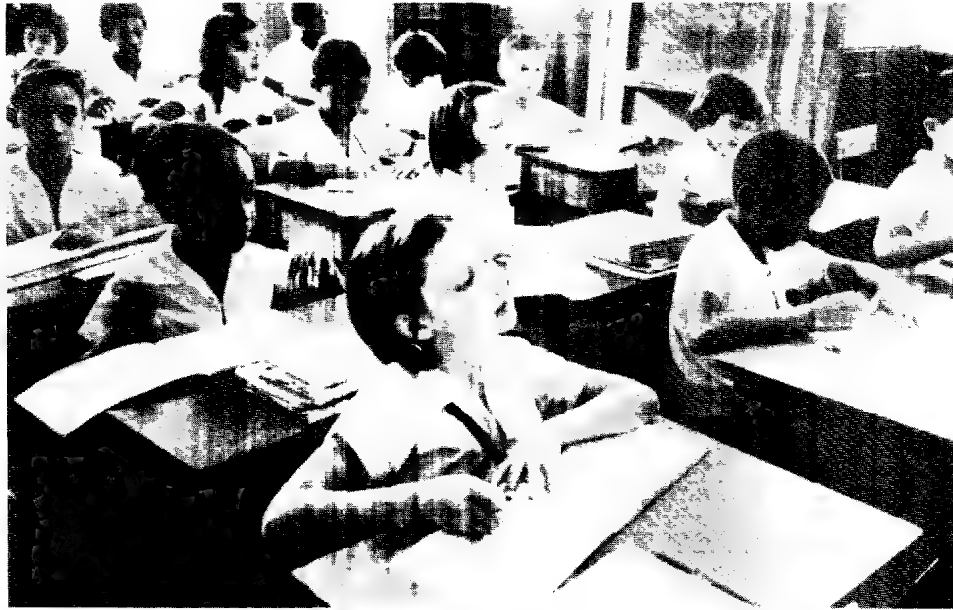


Figure 87. Elementary school classroom in Rio de Janeiro. The children are of various racial backgrounds.



Figure 88. School children in Londrina, Paraná. Their faces reveal that they are of German, Japanese, and Italian parentage.

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school seem like a waste of time for children who can be usefully employed at home.

As of 1963 there were 27 legally recognized universities in Brazil, of which 19 are supported by the government. Most are located in the southeastern and southern states. Brazilian universities follow a pattern typical of several Latin American countries, in which many of the professors teach only part time, depending for their livelihood on income derived from two jobs. Students also generally attend part time, and many of them hold jobs while attending the university. Brazilian student unions are highly organized and wield considerable influence in the university and nationally. Student academic centros (centers) within each school are affiliated into so-called central student directorates, which in turn are organized on a state and national level and receive financial subsidies from the government. From this unique position of strength, students can and do influence national affairs, and from the hierarchy of student unions many of the nation's political leaders emerge.

E. Religion

The overwhelming characteristic of religion in Brazil is the blending of folk religions with elements of Christianity, especially Catholicism. Four centuries of fusing African and native Indian magico-religious practices, Spiritualism, and Christian monotheism have produced a heterogeneous mixture of religions that almost defies analysis. Although regionally there are wide variations both in degree and outward manifestation, folk religion is prevalent all over Brazil and permeates the daily behavior of a very large percentage of the population, even devout Catholics and Protestants. The degree of adherence to folk religions can be equated to a large degree with social and racial factors. Moving from the white upper classes down through the color and social scale, one may note the shift from intellectual Christianity to the conscious mingling of Christian principles with some fetish rites until, at the bottom, the beliefs in magico-religious cults reaches its zenith.

Geographically, African influences predominate in the Northeast and East -- reflecting the largest influx of slaves in colonial times -- while European influence and adherence to accepted Church dogma is evident in the southern part of Brazil. Large numbers of active Catholics and Protestants are found in urban areas where education and social status reach a sophisticated level. The rural Brazilian has absorbed religious concepts and practices from several directions, with

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little if any guidance or restraint on the spiritual interpretations that seem to suit his needs best. Unacculturated Indian tribes of the interior observe primitive rites that differ in detail from group to group, but all are characterized by animistic beliefs, shamanism and other powers of the supernatural.

Brazil is nominally a Roman Catholic country (nearly 95 percent) despite a tradition of religious freedom that has existed since colonial times. If the 1960 census figures are accurate, Brazil has more declared Catholics than any other country in the world -- nearly 68 million. In view of actual religious practice, however, most of these are "marginal" Catholics who combine some aspects of folk religion and mystical rites with the rituals of the Church. According to the Catholic clergy, only 6 to 8 million Brazilians may be strictly defined as practicing Catholics. In addition to these, some 45,000 persons belong to the Greek Orthodox Catholic Church. A somewhat larger number of Syrian immigrants are Maronites, adhering to an Eastern Mediterranean branch of the Uniate Church.

The city of Salvador is the center of the Catholic Church in Brazil and the residence of the primate, the Cardinal of Bahia. Countrywide, the ratio of priests to parishioners is about 1 to 8,000, based on the estimated number of actual practicing Catholics; if based on the recorded number of Catholics, the ratio is 1 to 60,000. Nearly half of the clergy, however, are located in the states of São Paulo, Rio Grande do Sul, and Minas Gerais, leaving the balance to serve the large remainder of the country. In some rural areas, one priest may serve as many as 20 to 30 churches. Because churches are widely dispersed, he may conduct Mass in any given church only once a year or less. Consequently widespread laxity in religious matters is the normal pattern, and the impact of the Church on daily living is much less effective than in most Latin American countries. For much of the nominally Catholic population, conformity to traditional custom -- especially at weddings, funerals, and the numerous holy days -- reflects acknowledgment of the role of the Church as a catalyst rather than any dependence upon it as a bulwark of spiritual strength.

Because the Church historically has had less authority and prestige under the Portuguese pattern of colonization, it has played a much less influential role in the development of Brazil than in such countries as Peru and Mexico. The caliber of the Brazilian clergy has been unfortunately low, often drawing on recruits having little education or few moral

qualifications. Indifference toward religious proprieties is common, and a generally low degree of respect for the clergy has produced a somewhat lax attitude toward the formalities of the Church. The past two decades, however, have witnessed determined efforts by the Church to raise its standards, especially by more careful selection of new priests and greater depth in ecclesiastical training.

The increased participation of the Church in local religious, social, and political activities has led to the development of Catholic action groups. These groups support programs to eliminate slum conditions and to improve rural welfare and land reform, and they also urge the participation of laymen in cooperative ventures, particularly banking, storage, and marketing. The Catholic-sponsored Rural Labor Unions and Institute of Rural Leaders are examples of Church programs designed to counterbalance the more radical, Communist-influenced Peasant Leagues and other leftist groups pressing for social reforms.

The Protestant Church is relatively unimportant in Brazil, despite a membership of nearly 2,000,000 -- the largest number of Protestants in any Latin American country. Sixty percent of all Protestants are members of either the Evangelical Lutheran Church or the Assembly of God, each having about 500,000 members. The remainder belong to some 70 churches, the strongest being the Baptist, Presbyterian, and Methodist. Protestants are concentrated mostly in the southern states. Smaller groups are scattered through the eastern states, and missionary groups are in the rural areas to the west. In the nearly 8,000 Protestant churches in Brazil, the ratio of ministers to members is 1 to 250. The common fundamentalist precepts of the leading Protestant groups are not generally appealing to the Brazilian temperament, and many converts need continuing inspiration.

Other large religious groups include 680,000 Spiritualists, according to the 1960 census, but some estimates indicate that there are actually three times that many; Brazil has more Spiritualists than any country in the world. Buddhists, tabulated in 1960 at 175,000, probably are even more numerous than that and are found among the rural Japanese population, which totals over 400,000. Approximately 140,000 Jews live in Brazil, mostly in cities. No official figures are available for the number of persons (mostly Negroes) who belong to the cults that were brought to Brazil from Africa, as many of them identify themselves as Catholics or as Spiritualists despite adherence to primitive groups. As a result, the many variations of folk religion throughout Brazil are difficult

to isolate or evaluate statistically as identifiable religious movements.

The most dominant of the cults that abound in Brazil are the numerous versions of the Gêge-Nagô religion introduced by Sudanese Negroes. The core aspect of these Sudanese cults is the grigri or fetish which is a "prepared material object" endowed, through special rituals, with the presence of a spirit. The ceremonies of such cults are known as macumbas in the Rio de Janeiro area, candomblés around Salvador and xangôs and catimbós in the Northeast. They include spiritual communication with one or more of the numerous dieties or orishas that embody specific spiritual realms. Communication between human beings and these gods presumably can be effected through male or female mediums or sacerdotes, people who have special attributes and make special preparations. An inner group of devotees is consecrated to the cult of the orishas and undergoes involved rites of "initiation." Drum-dominated music and dances, many of which are of African origin, are integral parts of the magical rituals that may last for hours and even days of hypnotic trance, culminating in the total physical and emotional collapse of those possessed of the spirit of the fetish.

Bantu religious culture is also evident in these Brazilian rituals, but its original theological framework was never as complex in Brazil as the Gêge-Nagô. Its primary contribution to Brazilian religion has consisted of a cult of the dead, ancestor worship, a belief in transmigration of the soul, and many beliefs that relate it to the practices of spiritualism. Bantu macumbas are simpler in ritual and physical setting than those of the Gêge-Nagô, and their high priests, called quimbandas, are often referred to as "mediums" because of the spiritualistic influence. The amalgamation of Gêge-Nagô, Bantu, aboriginal Indian, Spiritualist, and Catholic forms of ritual has been taking place during the past 300 years, with more emphasis on one or another ritual in different locales. It is practically impossible to trace back the various elements of the rituals to their original, pure form.

Throughout Brazil a strong belief in the supernatural prevails, and in every locale there are mysterious beings who exist in the minds of the populace as friends or enemies. The pe de garrafa (bottle-footed man) lures herb collectors until they are lost in the woods of southwestern Mato Grosso; the mal d'agua (water mother) attracts men to their doom in lakes or rivers, and her masculine counterpart -- the bôto -- similarly lures women. The lobis homen (werewolf) is feared in rural Brazil, and anemia is an indication that one has been



Figure 89. Christianized shrine of African cult in slum area of Rio de Janeiro. Shrines such as this attract regular worshipers and are the scenes of highly emotional religious ceremonies.



Figure 90. Northeasterner selling leather charms that are presumed to guard against snakes. Note the Indian, European, and Negro features of the Brazilian bystanders.

victimized by such a fiend. In some areas the curupira is a vicious little man feared because his feet are backwards, leaving tracks that lead victims into his destructive arms. Many other beings figure daily in the monotonous lives of rural Brazilians throughout a large part of the country, providing emotional outlets for fear, anger, frustration, or even rejoicing and adding some zest to the simple subsistence patterns of living that prevail.

F. Housing

The miles of ultramodern skyline of Brazil's major cities are a false façade for the miserable hovels that are typical for the country as a whole. A study based on the 1950 housing census (still largely valid) showed that only 15.6 percent of all homes had running water, only 24.6 percent had electricity, and 33 percent had indoor toilets. If urban homes are excluded from the analysis, the comparable percentages for rural homes were 1.4, 3.6, and 10.4, respectively. The "public utility services," in small towns fortunate enough to have them, frequently serve only public buildings and, perhaps, the few persons able to pay high rates.

In 1963 estimates indicated that 5.25 million new houses were needed and that 2 million existing houses were unfit for habitation. The population expansion has for years completely outdistanced the construction of new houses, and the result has been overcrowding in inadequate quarters.

The outstanding example of housing shortage is the growth of the favelas in Rio de Janeiro -- conglomerations of shacks pieced together out of zinc sheeting, canvas, packing cases, rough tile, or anything else that can be gotten cheaply or at no cost. These shacks are often so small that there is no room for beds. Described by one authority as "communities of squalor," the favelas occupy precipitous slopes and are separated by crooked paths. There is no effective sewage system; occasional rainstorms wash away refuse in the gullies between and through the shacks. One survey in Rio de Janeiro located 194 favelas in which nearly a million people live -- almost a third of the city's population. Although many people who live here work at respectable jobs, they can find no better dwellings in the overcrowded city. Water is the greatest problem; some favelas are a kilometer away from the nearest public spigot, and 5-gallon cans of water are carried daily up the steep slopes. Similar clusters of shanties are called cortiços in São Paulo, malocas in Pôrto Alegre and Belo Horizonte, and mocambos in Recife (where 50 percent of that city's population live); all of these settlements are inhabited primarily by migrants from rural areas.

The more stable elements of society in Brazilian cities live in considerably better circumstances, even if by American standards the houses are small and crowded. Typically, the houses are connected to one another and constructed flush with the sidewalk. Each has several rooms along a long hall which leads to an open patio in the back. Only the wealthy have open ground around their houses, usually in the elegant suburbs. Recent decades have seen the construction of high-rise apartments in the larger cities. Services unfortunately have not kept up with the new structures, and dependable water supplies, electricity, sewage systems, and garbage collection are often lacking.

Rural homes are typically 2- or 3-room wattle-and-daub houses constructed with wooden frames filled with mud and roofed with thatch. The best of them are coated with a lime and soil plaster that retards deterioration somewhat, but none last many years. Windows are simple openings, usually without glass. Floors are ordinarily bare dirt, often with puddles of dirty water and littered with kitchen refuse, but sometimes have raised wooden, cement, or brick floors. Open hearths without chimneys are used for cooking, and the smoke seeps through cracks in the soot-covered walls and roof. Knowledge of hygiene does not exist, and ordinarily there are no sanitary facilities either indoors or outside. Consequently, water and food are polluted, and vermin breed in the wattle-and-daub walls and thatch roofs.

Not all rural dwellers live in abject poverty, but there is little incentive or opportunity for the average family to alter its circumstances. The casa grande of the fazenda is a structure of comparative splendor, having numerous amenities unknown to the workers nearby. Midway between the large landowners and ordinary caboclos, are a few prosperous, small landowners -- particularly among the southern colonization areas -- who have comfortable houses not unlike those in the part of Europe from which they came.

Houses along the flood plains of the tropical Amazon Basin are built on stilts to protect both family and animals during periods of high water; walls of dwellings are woven of palm to permit free air circulation. The entire structure is simple and suited to the transitory life of subsistence farmers. Houses of the primitive Indians scattered throughout the Amazon Basin are similarly temporary, usually built with no walls, having only heavily thatched roofs supported by timbers.



Figure 91. Woman transporting 5-gallon can of water on her head in typical Brazilian fashion.



Figure 92. Favelas on steep hillsides of Rio de Janeiro. These slums have no water, sewage, or unused space.

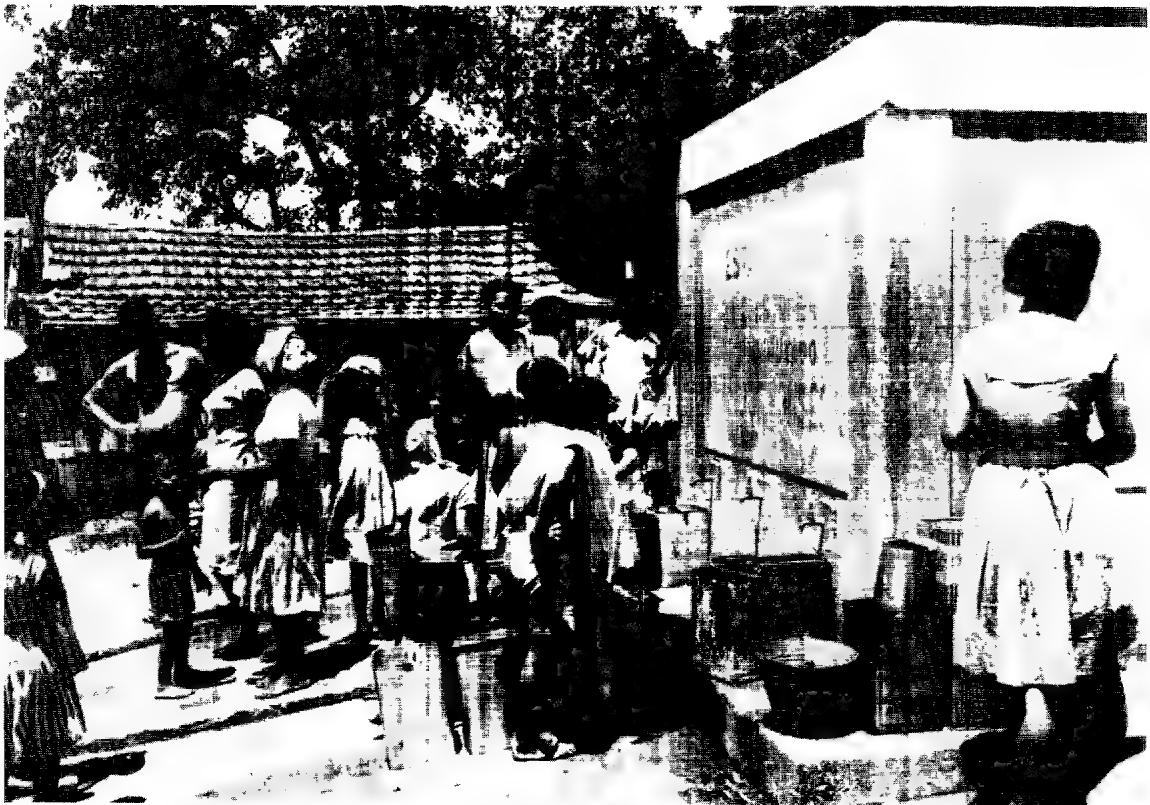


Figure 93. Residents of slum area in Rio de Janeiro obtaining water at public water spigots.



Figures 94a and b. Favelas in Rio de Janeiro.
Some houses are supported by the roofs of
houses below.



94b



Figure 95. Copacabana Beach in Rio de Janeiro, ringed with elegant apartments and backed by sprawling favelas on the hillsides.



Figure 96. Business district of Curitiba, Paraná. The modern skyscrapers are typical of most of the growing cities in Brazil.



Figure 97. Poorly maintained lower middle class homes in São Paulo. Homes like these are served by public utilities.



Figure 98. Residential street in Novo Hamburgo, a progressive Dutch colonization settlement in Rio Grande do Sul.



Figure 99. Stilt house along the Amazon. Such houses are typical where the wide flood plain is inundated seasonally.



Figure 100. Wattle-and-daub house, characteristic of much of interior Brazil. In many sections thatch is commonly used for roofs instead of tile. Note manioc in the foreground.



Figure 101. Thatched-roof and frame houses in a Waiká Indian village in Roraima.



Figure 102. Typical houses of Xavante Indians on the Rio das Mortes. An intricate wooden framework supports the dense cover of thatch.



Figure 103. Thatched-roof house of Kaxináua Indians. This house is long enough (85 feet) to house a dozen or more families, each in its own section with a separate hearth.

G. Health

The general state of health of the population throughout Brazil is poor. Ignorance, poverty, polluted water and food, lack of sanitary facilities, inadequate means of food preservation, improper diet, insufficient medical facilities, reliance on folk medicine, and many similar conditions make improvement slow and costly. The government has for several decades been aware of the urgent need for widespread health controls, and numerous programs under the Ministério de Saúde (Ministry of Health) and other organizations are gradually raising health standards.

Health conditions in the cities are far superior to those in smaller towns or rural areas, but even in the urban centers sanitation facilities and health services are not available to the poor. Diseases that have long been considered under control in most modern societies -- typhoid fever, diphtheria, tuberculosis, smallpox, malaria -- are still endemic in many parts of Brazil. Nevertheless, improved health conditions are clearly measurable from year to year as a result of the continued efforts throughout the country, especially those of the rural postos de saúde (health posts), active since 1942. Between 1950 and 1960 average life expectancies were increased by 10 years in the North and West-Central regions and by 20 years in the South. Infant mortality is only a little over 100 per 1,000 births for the capital cities but ranges between 300 and 400 per 1,000 live births in the Northeast. If infants born in backward areas escape tetanus, acquired by unsanitary practices of midwives, they often succumb to malnutrition, since no milk is available and they eat a regular adult diet (black beans, manioc meal, and jerked beef) as soon as they are weaned. The principal causes of death during the first 4 years are gastroenteritis, diarrhea, and parasitic diseases.

The high death rate among all age levels in Brazil stems from widespread conditions that are conducive to a variety of chronic or fatal diseases. Schistosomiasis (liver fluke) is extremely difficult to control, especially in the Northeast where the host snails and mollusks are common foods and the drinking water is ordinarily polluted. The wattle-and-daub houses typical of the Brazilian countryside are infested with the insect that transmits the incurable Chagas' disease that reportedly affects 4 million Brazilians, and control measures are difficult to administer. Malaria still occurs, although it has been eradicated in all urban and most rural areas; the same is true for bubonic plague. Ordinary yellow fever was considered eradicated by 1954, but a jungle variation of the

disease still occurs sporadically in the Amazon rain forest, where mosquitoes breed and certain species of monkeys provide the vehicle for the complete cycle of the disease. Brazil has recurring epidemics of smallpox and continuing incidence of leprosy and trachoma, although control measures are becoming more effective every year. Venereal diseases are widespread. Parasitic diseases are the rule rather than the exception for the entire rural populace; over 90 percent of the children in the Northeast are reported to have some worm disease, particularly hookworm which is easily acquired by walking barefoot in the polluted soil. In order of importance the principal causes of death due to illness throughout Brazil are heart diseases, gastritis and enteritis, influenza and pneumonia, cancer, tuberculosis, diseases of the central nervous system, and parasitic illnesses. Respiratory ailments account for 25 percent of all deaths.

Use of narcotics is not uncommon in Brazil, creating serious social problems, especially in urban areas. The consumption of marijuana is most widespread and cocaine ranks second. Marijuana is grown as a secondary crop on plantations in the Northeast where its use is traditional, but it is widely sold in the South; 5 tons are estimated to be consumed annually in São Paulo alone. Little is done to enforce the law prohibiting the sale of narcotics, and a maximum sentence of 5 years does little to deter its promoters.

Brazil has about 40 doctors per 100,000 persons -- nearly average for Latin American countries. The World Health Organization reported in 1959 that 27,111 physicians were serving either on hospital staffs or in health services; at that time 31 medical schools were graduating about 1,600 doctors annually. In addition, six schools of public health enrolled approximately 300 students per year. Beginning in 1959 the National School of Public Health provided graduate training in all branches of medical practice.

Over 60 percent of the country's physicians are located in the states of São Paulo and Guanabara, where they serve only 28 percent of the population. The distribution of the remaining 40 percent of the physicians is therefore sparse in many sections; for example, in 1963, 25 percent of the municípios in the state of Pernambuco had no resident doctors. Although highly respected, most physicians are poorly paid and often combine government and private practice to increase their incomes. The lack of available doctors has placed undue dependence on pharmacists, who dispense advice, home remedies, and drugs across the counter without prescriptions. In rural areas, people consult doctors rarely if at all. Midwives are relied



Figure 104. Residents of Rio de Janeiro favelas attending hygiene class.



Figure 105. Nurses in training. Nursing is still considered a very lowly occupation in Brazil.



Figure 106. Northeastern child leading donkey from town waterhole. All over Brazil daily water supplies are procured from such easily polluted sources.

upon to a great extent, and efforts are being made to get basic instruction to them on simple first aid and hygiene. The native healers (curandeiros and pages) are commonly consulted, but no training has been instituted to modify their magical and superstitious practices.

Qualified nurses are scarce in Brazil, and most of those that are adequately trained serve in the better-paying private institutions. As a result, partly trained or even untrained nurses staff many public hospitals, often performing beyond the limits of their professional capability. Thirty-seven professional nursing schools produce graduates at varying levels of competency, and 53 schools offer a 6-month nurse's aid course for elementary school graduates.

As of 1960, Brazil had only 2,622 hospitals of all types, more than two-thirds of which were in the six southernmost states. There were at that time a total of 233,403 hospital beds -- less than four per 1,000 Brazilians. The 18 percent of the total number of hospital beds that were located in institutions run by the government or other nonprofit organizations were generally filled. The 82 percent of the beds that were in private hospitals were often empty.

A wide range of public health services is available in Brazil, and overall governmental expenditures for health account for approximately 5 percent of the total national budget. The Ministério de Saúde is responsible for medical care and disease prevention, and it is augmented by the Serviço Especial de Saúde Público (Special Service for Public Health), which runs 400 health stations throughout the country. The best of these stations offer X-ray service, laboratory examinations, dentistry, home visits, syphilis tests, prenatal advice, immunizations, and instructions regarding sanitation, but because of the limitations of personnel and equipment many stations offer little more than first aid.

State departments of health also provide health centers, the best of which are manned by doctors, nurses, and a small staff; the poorest are operated by nurse's aids. In addition to the health centers, there are some 450 medical posts and about 1,800 child welfare posts. At the latter, prenatal clinics, milk dispensaries, and examination stations strive to raise the level of child health. The Ministry of Education and Culture has instituted health examinations of school children in some states. Attention to the health of children, as well as mothers, has always been predominant in Brazilian efforts to improve health conditions.

SECRET

Industries, some of the larger agricultural enterprises, and labor organizations also provide their personnel with clinics, medical services, and occasionally private hospitals. A very complex system of social security institutes -- under the general supervision of the Ministério da Trabalho e Previdência Social (Ministry of Labor and Social Welfare) -- also provides clinic and hospital services, some in the institute's own facilities but most under contract to independent hospitals.

H. Occupations

Brazilian workers are predominantly agricultural; in 1950 (latest data available) 58 percent were engaged in agriculture, herding, and forestry. Other occupations of the economically active (in percent of the total) were as follows:

Manufacturing and processing	9.6
Wholesale and retail trade	5.6
Transportation, communication, storage	4.1
Domestic service	4.0
Construction	3.4
Extractive industries	2.8
Social activities (educational and church)	2.5
Public administration	1.5
National defense and security	1.4
Real estate, banking, insurance	0.7
Professions	0.5
Other services	5.9

Estimates in the late 1950's indicated that the increase in industrial activity since 1950 had caused an influx of workers into industry, many of whom shifted from the agricultural labor force. On the other hand, the 200,000 annual migrants to the urban areas are generally ill equipped for work in the cities, and a third of them migrate home again. Trends and proportions indicated by the 1950 census are still essentially valid.

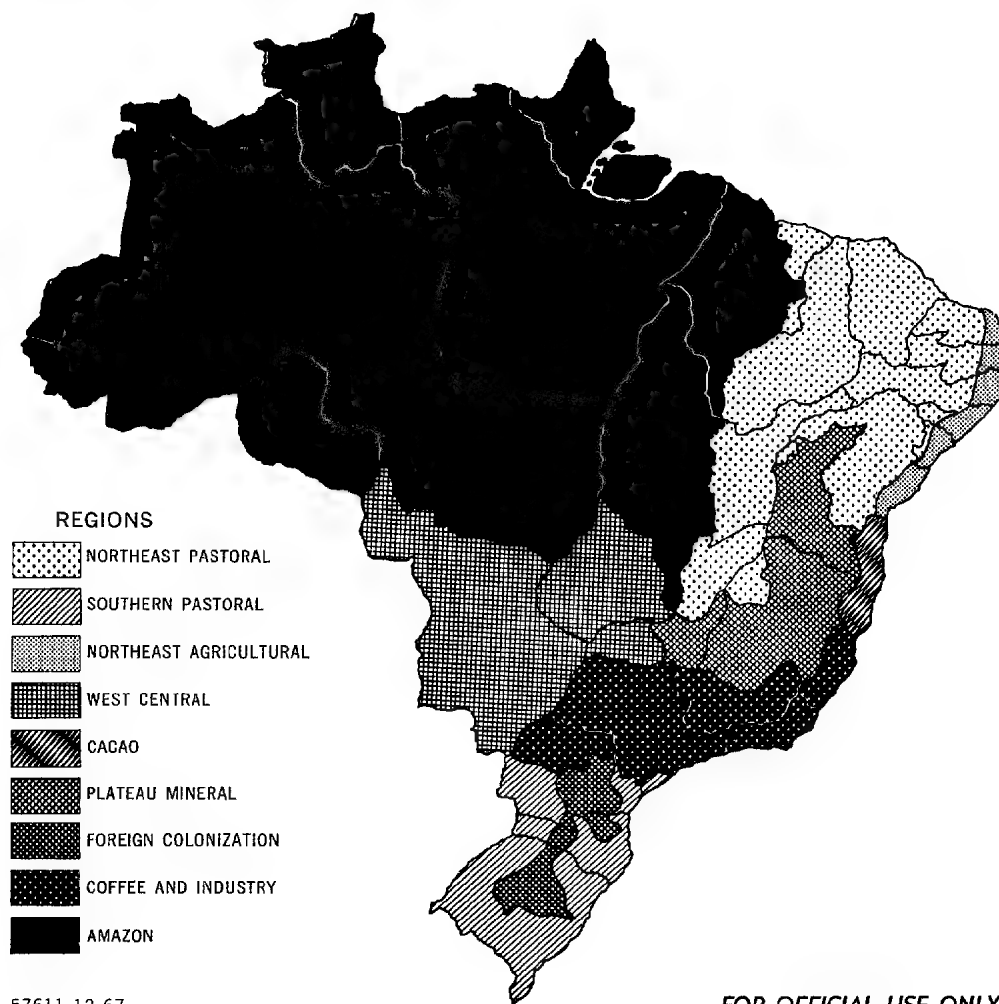
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Occupational statistics in Brazil are difficult to interpret, as it is customary for those in moderate and well-to-do circumstances to hold down more than one job. Reports for 1950 illustrate this confusion since the small percent of the working force that indicated supplemental employment was from domestic or agricultural groups rather than from more sophisticated levels. Another complicating factor was the inclusion of 6,308,567 children, aged 10 to 14, with no cross-tabulations by age, making it impossible to evaluate the dimension of the productive adult working force. Only a small proportion of the populace was registered as self-employed. The census also revealed a high correlation between socioeconomic status and color; whites and Japanese ranked highest in employer status, and Negroes ranked highest in the employee category.

A 1960 study of human activities on a regional basis divides the country into nine socioeconomic regions (see Map 57611) based on economic and occupational factors, as follows:

<u>Zone</u>	<u>Activity</u>	<u>Typical worker</u>
Northeast Pastoral	Cattle fazendas	Mamelucos, Vaqueiros
Southern Pastoral	Cattle and agriculture	Gauchos
Northeast Agricultural	Sugar <u>usinas</u>	Mulattoes
West-Central	Cattle, small farms, extraction of precious stones	Mamelucos
Cacao	Cacao	Mulattoes and Negro migratory workers
Plateau Mineral	Mining and Metallurgy	Mamelucos, Mulattoes, Jews
Foreign Coloniza- tion	Diversified farming, Japanese truck farms	Europeans and Japanese
Coffee and Indus- trialization	Coffee, cattle, industries	Whites, Mestizoes, Mamelucos
Amazon	Subsistence crops, rubber, nuts, timber	Indians, Mestizoes

Brazil: Socio-Economic Regions





107a



107b



107c

Figure 107. Rubber tapping in Amazon Basin. The slit bark (107a) yields dripping latex (107b), which is reduced to huge balls that are spot checked (107c) for quality before shipping.

I. Attitudes and Loyalties

Defining the basic attitudes and loyalties of a people that are dispersed geographically and diversified economically and socially demands oversimplification. Brazilians have a well-established reputation for tolerance, warmth, and candor. They have a flair for the speculation that has dictated much of their historical expansion into new fields of endeavor. They are notorious opportunists, not only in business and politics, but in personal situations as well. Abundantly endowed with a keen sense of humor, even when directed at themselves, Brazilians tend to maintain a genuine attitude of cordiality under the most difficult situations. One of the characteristics for which Brazilians are best known is the ability to compromise -- a trait which has guided the country's political history through numerous transitions without the violence typical of most of the rest of Latin America.

Brazil's national unity has been called its chief miracle, particularly in view of the fact that some of its regions surpass in size most of the neighboring countries. Regional differences have resulted in several identifiable "types" among the Brazilian people. In the south the gaucho is symbolic of the frontier spirit of individualism and energy. Here also are found the most concentrated groups of immigrants in Brazil, primarily from Europe, and they are characterized by individual initiative and propensity for hard work. Strong loyalties abound among the mineiros of Minas Gerais, the fluminense of Rio de Janeiro state, the famous cariocas of Guanabara State and the city of Rio de Janeiro, and the capixabas of Espírito Santo. Political rivalries exist between São Paulo and Minas Gerais, and competition is always rampant between Paulistas and cariocas.

Regional consciousness in the Northeast is less pronounced than in any other settled part of Brazil. The constant struggle for existence by the lower classes and the power of the absentee landowners have reduced loyalties in that region, and migration from it has been constant for many years. The development of social and political consciousness among the poor and underprivileged of the area has been a significant development, however, and their collective attitudes -- as yet relatively passive -- may ultimately emerge as one of the dominant social forces of the country.

The West-Central Region of Brazil is a pioneer fringe, where settlement is slowly being pushed westward into the interior. The development of Brasília has initiated a new surge into this area, bringing a new level of sophistication into the back country.

Brazilians in the Northern Region lack regional awareness, being woodsmen, boatmen, or collectors in the forest living on the most elementary level in Brazil.

The outstanding characteristic of Brazilian life is the lack of racial discrimination in a society once divided into masters and slaves. Although there is a very distinct class structure in Brazil, its levels are based on attainment rather than race. Wealth, education, talent, social manners, dress, family background, and cultural activities all are factors, but Brazilians do not automatically identify class status with race. Thus, persons of dark skin may belong in the upper class while others of light skin may fall far lower in the class structure. While it is true that most Negroes are in the lower classes, their lot has not been cast by the color of their skin.

J. Insurgency Potential

Throughout its history, Brazil has endeavored through nonviolence and compromise to cope with economic and political conditions that would have produced inflammatory reactions in the more volatile Latin American countries. Brazilians have traditionally avoided disruptive revolutions, championed law and order, bowed to authoritative control, and sought peaceful, if inadequate, solutions to critical problems. Still, there can be little doubt that a dormant potential for dissidence exists in the complex social, economic, and political dimensions of the country.

The army has a long tradition of loyalty and patriotism, and the armed forces can be expected to counter any threat to the Constitution or to representative government in an orderly manner. The revolution of April 1964 against João Goulart's leftist regime was conducted quickly under constitutionally sanctioned procedures, and there was little violence beyond the few incidents that occurred during mass demonstrations. Goulart, himself, had gained power in a similarly tense but nonviolent and adroit shift in government when Quadros resigned unexpectedly in 1961.

Recent decades have brought profound changes in all phases of economic, social, and political life, thereby altering established social patterns and value systems. A restive element among Brazilian youth is responding to leftist agitation. Massive internal migration from rural to urban areas has permitted previously passive and extremely poor peasants to discover the possibilities for change in their traditional way of life. Intense social problems are developing in urban

slums, such as Rio de Janeiro's favelas, and in the overcrowded and intolerable sections of the Northeast. A growing trend among the masses of underprivileged Brazilians has been called a "revolution of rising expectations," which is based on the desire for a higher standard of living and is stifled by the inability to achieve it.

The rural peasant has had little or no experience with firearms and is typically uninformed about national affairs. A 1960 poll revealed that one-half of a rural sampling could not name the president or president-elect. Throughout vast areas, the peasant has always looked to his patrão (patron, landowner) for solutions to his needs, and any shift from this traditional pattern would require strong evidence that it would be for the better. If he were persuaded to become involved in some action of a paramilitary nature, his role would be one of minor support rather than active, intelligent, or responsive participation.

Little in the way of support for established order could be expected from the primitive indigenous Indians. Although some groups have had ample practice in their own brand of hostile behavior, their motivations have been aimed at tribal isolation and self-preservation, and issues of vital concern to the Brazilian populace are beyond the comprehension or concern of the unacculturated Indian groups.

Table 1
Population of Brazil

State or Territory	Percent Increase 1950-60	Population In Thousands		(est)
		1960	1966	
São Paulo	42	12,974	15,845	
Minas Gerais	27	9,798	11,189	
Bahia	24	5,991	6,750	
Paraná	102	4,278	6,450	
Rio Grande do Sul	21	5,449	6,340	
Pernambuco	22	4,137	4,620	
Rio de Janeiro	48	3,403	4,259	
Guanabara	39	3,307	3,977	
Ceará	24	3,338	3,755	
Maranhão	57	2,493	3,234	
Santa Catarina	38	2,147	2,579	
Goiás	73	1,955	2,565	
Paraíba	18	2,018	2,211	
Pará	40	1,551	1,857	
Espírito Santo	38	1,189	1,427	
Piauí	21	1,263	1,397	
Alagoas	16	1,271	1,380	
Rio Grande do Norte	20	1,157	1,274	

Table 1 (Continued)

State or Territory*	Percent Increase 1950-60	Population In Thousands		(est)
		1960	1966	
Mato Grosso	76	910	1,254	
Amazonas	41	722	870	
Sergipe	18	760	834	
Serra dos Aimorés	140	384	640	
Acre	40	160	193	
Rondônia (T)	92	71	103	
Amapá (T)	84	69	97	
Roraima (T)	63	29	39	
Fernando do Noronha (T)	139	1	2	
Brasília	0	142	na	
Total		70,967	85,141	

* Territories are designated by (T).

Table 2

Brazilian Cities With Populations Over 150,000
1960

<u>City</u>	<u>Population</u>
Rio de Janeiro	3,223,408
São Paulo	3,164,804
Recife	788,569
Belo Horizonte	642,912
Salvador	630,878
Porto Alegre	617,629
Belém	359,988
Fortaleza	354,942
Curitiba	344,560
Santos	262,048
Santo André	230,196
Niterói	228,826
Campinas	179,797
Duque de Caxias	173,077
Natal	154,276
Manaus	154,040
Maceió	153,305

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Table 3

Immigration to Brazil by Major Sources of Origin
1884-1962

<u>Country of Origin</u>	<u>Number of Persons</u>
Italy	1,479,295
Portugal	1,407,062
Spain	654,512
Japan	235,338
Germany	186,380
Russia	110,988
Austria	88,385
Turkey	78,854
Poland	53,771
Rumania	40,058
France	39,570
United States	34,224
England	29,460
Lithuania	28,665
Argentina	26,823
Yugoslavia	24,130
Syria	22,959
The Netherlands	13,049

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Table 4

Culture Areas

Linguistic Family	Total Number	Cultural Traits	Level of Contact and Attitudes Toward Outsiders	
			Attitudes Toward Outsiders	
		Area 1: Amazon Basin		
		(Tropical rain forest interspersed with areas of open plains)		
Aruak	450 (a)* 300 (d) few (c)	Manioc cultivation common. Some hunting, fishing, and gathering. Bows and arrows common; blowguns in center and west; curare used. Bark canoes common. Villages have 20 to 50 persons. Houses round or rectangular. Shamanism well developed throughout; ancestral cults in west.	Most villages isolated; many on lower river courses have permanent contact, especially in west. Attitudes generally friendly except in two areas north of Rio Negro.	
Karib	600 (a) 3,500 (b) 6,000 (d) 80 (c)			
Tukána	3,500 (e)			
Tupi	400 (a)			
Xirianá	4,000 (c)			
Undetermined (called Tukána)	5,000 (f)			
		Area 2: Juruá - Purus (Lowland tropical rain forest)		
Aruak	2,000	Cultivation of sweet manioc more common than bitter. Paumarí are fishermen and gatherers. Use of tobacco and <u>chicha</u> (a fermented drink). Curare used, some blowguns. Canoes of bark or fire-hollowed wood. Beehive (conic) houses; Paumarí live on rafts. Shamanism and belief in Supreme God. Some endocannibalism among Panos. Some extended family villages.	Tribes in permanent contact or integrated on lower river courses; isolated and hostile in more remote areas. Deep-seated resentments date from late 1800's when rubber was intensively exploited in area.	
Pano	800-1,300			
Tupi	12			
Undetermined	275			

* Letters refer to sub-areas on Map 57545.

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Table 4 (Continued)

<u>Linguistic Family</u>	<u>Total Number</u>	<u>Cultural Traits</u>	<u>Level of Contact and Attitudes Toward Outsiders</u>
		Area 3: Guaporé (Forest and savanna woodland)	
Aruak	275	Maize and peanuts predominate; manioc secondary. Drink <u>chicha</u> and use tobacco. Curare used on arrows. Canoes. Beehive houses most common. Nambikuára nomadic. Belief in Shamanism and supernatural forces.	External contacts vary from permanent contact to isolated. Hostile in some areas; little intertribal acculturation.
Nambikuára	1,250		
Pano	?		
Tupi	335		
Txapakúra	450		
Undetermined	50		
		Area 4: Tapajós - Madeira (Forest and interspersed grassy plains)	
Tupi	5,000	Maize and sweet and bitter manioc cultivated. Drink chicha. Tobacco unknown. Bark canoes. Rectangular houses and double lean-to's largely replaced by typical Brazilian rural houses. Ancestor cult and Shamanism. Tattooing common.	Generally acculturated in north because of regular contact with missions and rubber tappers. Less contact in south, but known tribes are considered friendly; some groups are isolated.
Undetermined	700		
		Area 5: Xingu (Gallery forests, lakes, and grasslands above the Falls of Martius [Cachoeira von Martius] on the Rio Xingu)	
Aruak	160	Manioc cultivation; roots washed by hand presses instead of tipiti press. Round and oval houses, thatched sides. Bark canoes. Shamanism. Villages 20-140 persons; extended families.	Annual games competition and other manifestations of homogeneous cultural emergence. Most tribes are friendly but isolated on SPI reservation in the Xingu National Park, which is open to visitors holding permits.
Jê	270		
Karib	530		
Tupi	315		

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Table 4 (Continued)

<u>Linguistic Family</u>	<u>Total Number</u>	<u>Cultural Traits</u>	<u>Level of Contact and Attitudes Toward Outsiders</u>
		Area 6: Tocantins-Xingu (Open savanna with gallery forests)	
Jê	4,600	Potato, maize, and manioc common. House types vary; double lean-to's and beehive houses; some multi-family dwellings. Cots or mats used instead of hammocks. Limited skill at navigation. Shamanism practiced in some tribes. Sports competitions. Use tobacco; no narcotics. Village population may be as large as 600 persons.	Intertribal hostility. Some economic rivalry and sporadic friction with local Brazilians.
Tupí	100		
Undetermined	1,000		
		Area 7: Pindaré - Gurupá (Forests with babassu palm groves)	
Tupí	4,200	Manioc, maize, pumpkin, sweet potato; Guajá are hunters and gatherers. Open-sided, lean-to houses. Use of fermented drinks. Belief in Shamanism varies. Villages of 15 to 60 persons; extended families.	High degree of acculturation due to adjacent caboclo settlements of palm oil extractors, but the Guajá and the Urubús-Kaapor remain isolated. Generally friendly with outsiders.
		Area 8: Paraguai (Open grassland)	
Aruak	5,000	Originally divided into gatherers and sedentary agriculturalists; society complex and class stratified. Shamanism remains strong. Use tobacco and fermented drinks.	Largely acculturated into local society; friendly; now live in primitive fashion on SPI posts.
Guató	30		
Mbayá-Guaikurú	200		
		Area 9: Paraná (Open savanna and sparse forest)	
Tupí	3,600	Maize, beans, sweet potatoes, sweet and some bitter manioc. Some large oval houses but Brazilian houses more common. Some canoes. Use	Variously acculturated; most now live on SPI posts and are in permanent contact with Brazilian society. Friendly.

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Table 4 (Continued)

<u>Linguistic Family</u>	<u>Total Number</u>	<u>Cultural Traits</u>	<u>Level of Contact and Attitudes Toward Outsiders</u>
		Area 9: Paraná (Continued)	
		tobacco and chicha. System of collective labor. Christianization led to unique messianic migrations in small groups.	
		Area 10: Tietê-Uruguaí (Plains and areas of Brazilian pine; largely cultivated)	
Kaingáng-Jê	3,000	Many Indian religious and social customs retained. All participate in the local Brazilian economy. Coffee culture predominates.	Live on SPI posts but associate with and to some extent work for European colonists; in harmonious contact.
Xoklég-Jê	200		
		Area 11: Northeast (Scrub forest and open pastoral land)	
Fulniô	1,800	Except for language, most cultural traits have become subordinated to Brazilian customs. Fulniô tribes cling to native language and aboriginal religion; Maxakali tribe is monolingual.	Live on SPI posts. Integrated through long association with neighboring Brazilians. Mix freely with local society.
Karirí	550		
Maxakali	200		
Pankararú	2,200		
Pataxó	25		
Tupí	1,000		
Undetermined	10,425		

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Index to Indian Tribes by Culture Area

CULTURE AREA I: MONTENE AMAZON

Name of Tribe

Linguistic Family

Number

1. Akuri 400

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CULTURE AREA VI: TOCANTINS RINGOU

Name of Tribe

Linguistic Family

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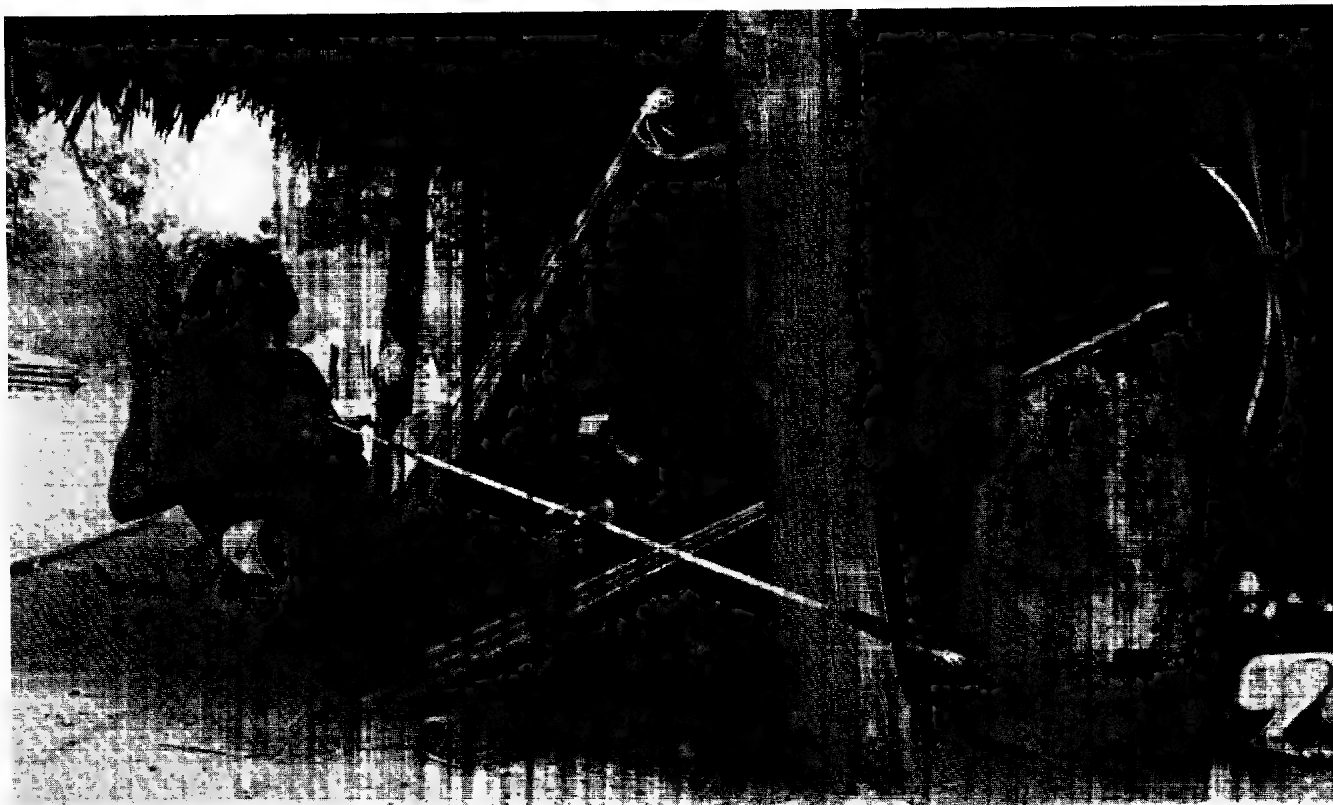


Figure 108. Tapirapé family unit characteristic of Amazon area.



Figure 109. Karajá woman preparing kalogi, which resembles cooked starch and is part of every Karajá meal. Wearing Western style clothing is one of the few non-Indian customs of this Rio Araguaia tribe.



Figure 110. Krahó Indian women preparing a huge meat pie out of farinha and hunks of meat, which will be folded in leaves and baked under layers of palm leaves on hot stones.



Figure 111. Indian girl harvesting peanuts. In the Amazon Basin peanuts are grown extensively and are cooked in various ways.

112a



112b



Figure 112. Krahó Indians on customary annual or semiannual fishing expedition. On such expeditions the Indians build temporary villages (112a), smoke fish over hot coals (112b), and catch taraira (112c), which they value highly.

112c



Figure 113.
Indian woman carrying most of the essentials for a trip, so that men can keep arms free for defense and hunting. This load may weigh 60 pounds, not counting the pet dog.



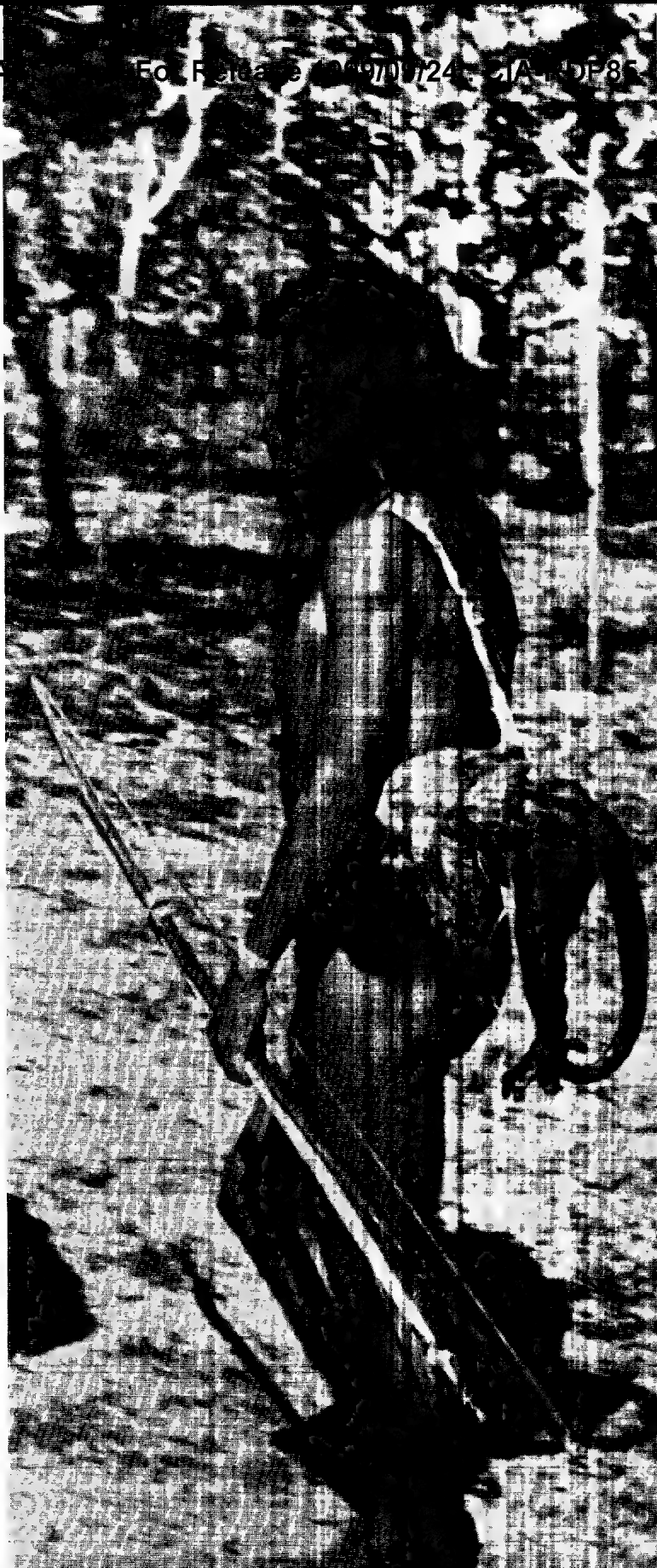


Figure 114. Indian huntsman. Monkeys are a favorite target and are considered a delicacy among the primitive Brazilian Indians.

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115a

Figure 115. Kaxináua Indian tribesmen building (115a) and launching (115b) a canoe. The combined efforts of many men are required.



115b



Figure 116. Suyas tribal dance. Tribal dances are still customary among many of the Indians of Brazil.



Figure 117. Primitive Xiriana Indians in northwestern corner of Brazil. These Indians are seldom contacted by visitors like this Brazilian woman.



Figure 118. Makuxi Indians north of Boa Vista, Roraima. These people have become largely acculturated through contact with cattle ranchers who have penetrated this remote area.

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Figure 119. Indians poling small canoe through shallow upper tributary of the Amazon. They are extremely clever at this type of navigation.

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V. Politics and Government

A. Current Problems

Along with its wealth of resources and its great potential for long-term progress, Brazil has an array of political, economic, and social problems stemming from unwise development as well as from underdevelopment. Efforts to deal with them are complicated by the sheer size of the country and the rapid growth of its population. Brazil's leaders waver between the use of authoritarian "hard-line" and liberal policies in their attempts to unify the country and to develop it properly.

One of the principal problems is that of sectionalist attitudes which remain strong even though the central government has been gaining power over the years. This is due in part to the country's inadequate transportation and communication network. With an area roughly equal to the US, Brazil has only one-tenth as many miles of railroads and highways -- and only about five percent of its highways are paved. Sectionalist views gain strength, moreover, from the glaring economic disparities between areas, especially between the prosperous, industrialized south-central and the impoverished, agricultural northeast. The political impact of sectionalism is apparent in the make-up of the traditional political groupings which represent local interests rather than national movements.

For the majority of Brazilians the overriding problem is the low standard of living. The per capita gross national product of about \$270 is below that of the other large Latin American countries. In the northeast and in some other areas, the peasants live in conditions comparable to those of South Asia, but in the south-central area living levels are about on a par with those of southern Europe. There is also a sharp contrast throughout the country between levels of living in the cities and those of the countryside. Consequently, there is substantial internal migration, especially in the northeast, towards the cities, which are growing at a rate more than double that of the nation as a whole.

Educational facilities are grossly inadequate. Of the total population, only 55 percent is literate -- even as defined by the 1962 government standard which required the individual only to write his name and assert that he could read. It is doubtful that as many as 15 percent of the people have completed primary school.

Since the end of World War II, the tremendous increase in urbanization, rapid industrialization, mounting popular indignation at the wide economic disparity among classes, and inflation have resulted in a host of new and complicated social problems that provide fertile ground for unrest and clashes of interest. Low income workers and peasants in particular are dissatisfied and constantly agitate for greater and faster social and economic reform. When remedies are not immediately forthcoming, demagogues seeking political power, labor leaders seeking economic power, or radical ideologists seeking a change in the national, political, and social order find it easy to organize or capitalize on strikes and demonstrations. Frequently, these manifestations are manipulated by professional agitators and deteriorate into fights, riots, and disorders that require strong police action to control. These pressures for change usually provoke counterpressures from those who wish to preserve the status quo or who look upon all social change as a drift toward communism and a challenge to existing law and the constitution. The resultant struggle severely taxes police and governmental capabilities and encourages political exiles in neighboring countries to seek to mount insurgency campaigns.

B. Structure of Government

1. Central Government

a. The Executive

The president, who is chosen by an electoral college composed of the Congress and delegates from the state assemblies, is the chief executive and central figure in Brazilian politics. His term of office is four years. He may not succeed himself nor be succeeded by the ministers of state, governors, supreme tribunal judges, military chiefs, or others specified in the constitution unless they have been out of office at least six months prior to election. In case the president is incapacitated his duties are assumed by the vice president or after him by the president of the Chamber of Deputies, the president of the Senate, and the president of the supreme tribunal. In addition to exercising presidential authority when the president is absent or incapacitated, the vice president also serves as president of the Congress.

The president is empowered to appoint and remove cabinet officers, make high administrative and judicial appointments (some of which require Senate approval), and serve as commander in chief of the armed forces.

The president received special powers under a new constitution promulgated in March 1967 through which he may call on the Supreme Court to suspend for a period of up to ten years the political rights of persons found guilty of subversive or corrupt activity. He is also authorized to declare a state of siege for 60 days (extendable for another 60 days) without first consulting Congress, although he must justify his action within five days. He has broad powers to intervene in the states' affairs and to issue decrees in the fields of national security and public finance. Congress can approve or reject such decrees but has no power to amend them. Congressional power is further restricted by a provision which reserves to the president the initiation of legislation pertaining to public finances, civil service, strength of the armed forces, and to the administration of the Federal District and national territories. Congress must act on the federal budget within a specified period or it becomes law as submitted -- a provision which ended one of Congress' time-honored methods for harassing and putting pressure on the chief executive. Time limits may also be set for congressional action on ordinary bills (90 days), and those designated as "urgent" by the president must be acted upon within 40 days or they become law as drafted. Although Congress may grant political amnesties, it may do so only with presidential concurrence. The chief executive may veto bills in whole or in part, although the Congress may override him by a two-thirds vote.

The president's cabinet is composed of the vice president and the heads of ministries. The chief of the National Intelligence Service and the attorney general frequently sit with the cabinet, although they do not hold cabinet rank. The chiefs of the president's civil and military households frequently have exercised more authority and may have greater influence than many cabinet ministers.

The executive branch of the government is an exceedingly complex apparatus consisting of many specialized administrative bodies, advisory bodies, foundations, government agencies, and mixed corporations. Some of these are directly under the authority of the president, while others are only loosely supervised by the executive. Among nearly 30 bodies directly under the president are the National Security Council, the National Atomic Energy Commission, the Tariff Commission, and the Northeast Development Agency. In addition, approximately 40 other entities are coordinated through the executive branch, many of them being responsible to one or more ministries. These include public foundations like the Getulio Vargas Foundation, which does research in economics, business, and

other fields; mixed capital enterprises like the Bank of Brazil, the National Steel Company, and the government oil monopoly, Petrobrás; government corporations like the Brazilian Coffee Institute; and organs of international cooperation like the Joint Brazil - United States Military Commission.

The problems of public administration are manifold. Corruption, extending even to the presidential level, had often been widespread prior to the Castello Branco administration (1964 - March 1967). The Brazilian bureaucracy, although reduced under Castello Branco, is still swollen. At the same time, however, there is a scarcity of personnel trained in modern administrative techniques. Time-consuming procedures remain the norm, although administrative reform efforts are aimed at streamlining archaic practices. Overlapping functions and responsibilities among government entities often blur clear lines of authority. Certain ministries are sometimes in direct competition, and there is often a lack of coordination not only within a ministry but also between the ministry and the government agencies loosely attached to it.

b. The Legislature

The Congress is composed of the Chamber of Deputies and the Federal Senate. The 409 deputies are elected for 4 years by popular vote, with proportional representation. Each state is entitled to at least seven deputies and each territory has one. The three senators from each of the 22 states are directly elected for terms of 8 years; to provide continuity, one-third and two-thirds of the Senate are elected alternately every 4 years. Complete illiterates are denied the vote, as are those who have been deprived of their political rights.

The Congress has generally been a conservative force, reflecting the over-representation of the more static rural regions. Presidents have often found it difficult to obtain a majority for their legislative programs. Agrarian reform bills, banking and tax reforms, and many other measures have become lost in the legislative labyrinths. Congressional opposition to President Quadros, with frequent overriding of his vetoes, contributed to his decision to resign in 1961.

Major changes in the relationship between the legislature and the chief executive occurred under Castello Branco and were codified in the 1967 Constitution through which Congress lost many of its checks over the chief executive. Congress, however, still retains its exclusive right to approve treaties; to authorize the president to declare war or make peace or to permit foreign troops to transit or temporarily remain on

Brazilian territory; to approve or suspend federal intervention or a state of siege; and to oversee the acts of the president and the decentralized agencies.

The constitution can be amended by recommendation from the Congress, the president, or members of state assemblies. An amendment is adopted when it obtains an absolute majority in both houses.

c. The Judiciary

Judicial power is exercised by the Supreme Federal Tribunal, the Federal Tribunal of Appeals, federal courts of the first instance, and the state courts which are empowered to judge federal cases and to apply federal law. On the local level there is at least one trial court in each município (roughly comparable to a US county). The states may also establish inferior jurisdictions, such as justices of the peace. In addition to the regular court system dealing with civil and criminal cases, there are special electoral, labor, and military courts with final authority in their specialized areas, but with appeal to the regular federal courts on constitutional questions.

The Supreme Federal Tribunal is composed of sixteen justices appointed by the president, subject to senate approval. The Supreme Federal Tribunal is empowered to declare laws unconstitutional and watches over the separation of powers within the federal government and between the federal government and the states. The courts have tended to interpret the constitution broadly, with a presumption in favor of the executive. Judicial tolerance of the executive use of decree power to legislate has become a tradition. Sometimes, especially during a crisis, the courts have given in to executive and military pressure, and during states of siege they have tended to take a limited view of their role. The courts, however, have maintained their independence and have often effectively opposed objectionable activities by the other branches of the government.

2. State and Local Government

Among the 22 states of Brazil the framework of government roughly parallels that of the federal government. The governors are popularly elected for four years. Except for not having power to issue decree laws, they have broad powers analogous to those of the president. The unicameral legislative assemblies, with powers similar to those of the national congress, are popularly elected for four years on the basis of proportional

representation. The state administrations vary widely in quality. In the more developed states, such as São Paulo, Guanabara, Minas Gerais, or Rio Grande do Sul, the governments have well-developed executive branches with large cabinets, autonomous agencies, development banks, and extensive public works programs. They also have relatively efficient civil services. In the poorer states, however, government services are rudimentary, and the level of competence and morality is often low.

Although the powers of the federal government overshadow those of the states and municípios, federalism is generally honored in practice as well as in theory. Intervention in the states by the federal government is permitted on certain grounds, such as to maintain "national integrity." One of the most recent examples of federal intervention in state affairs occurred in November 1964 when the governor of Goiás was ousted as a subversive. The restricted power of states to raise and retain revenues compels them to rely on federal assistance. Only the wealthiest states, such as São Paulo, come close to raising sufficient revenues to meet their expenditures.

The four territories in the remote north and west are administered by the federal government. The Federal District, which was moved from Rio de Janeiro to Brasília in April 1960, is governed by a mayor appointed by the president.

The only significant governmental unit of the state is the município. It is governed by a mayor (prefeito) and a legislative council (câmara municipal). The mayor is usually popularly elected. He is appointed by the governor in capital cities and in cases deemed by the president to be in the interests of national security. In some of the more remote regions, the local political boss (coronel) controls the choice of the mayor and is the real authority. The municípios are guaranteed autonomy by the constitution, and the states can intervene only under certain specified economic circumstances. The municípios have substantial powers of self-government, including the power to tax and license, but the majority of them have greatly inferior financial resources and must seek state aid.

C. Political Parties

Brazil has a two-party system which resulted in 1965 from legal restrictions placed on then existing political organizations by former President Castello Branco. The present system replaced the many highly factionalized political groupings represented in Congress which had existed since the days of dictator Getulio Vargas. In 1965 the government halted the

proliferation of parties because it feared they would encourage a return to the irresponsible politics dominated by personalism which prevailed prior to the overthrow of Goulart in 1964.

The two national parties are the National Renewal Alliance (ARENA) and the Brazilian Democratic Movement (MDB). The ARENA's strength at state and national levels far outweighs that of the rival MDB. The election of November 1966 gave ARENA 277 seats in the 409-member Chamber of Deputies and 47 of the 66 Senate seats compared to the MDB's 132 deputies and 19 senators. ARENA deputies also outnumber their MDB opponents in all but 3 of the 22 state delegations in the National Congress and hold a similar majority in the state assemblies. ARENA is dominated by members of the former conservative National Democratic Union (UDN) and the former moderate Social Democratic Party (PSD), although like the MDB, ARENA includes political figures from nearly all of the former 13 parties.

Although ARENA is a dubious vehicle for fulfilling its platform goal of "consolidating and purifying the progressive ideals which inspired the revolution of March 1964," it has provided the government with a fairly reliable political base in the Congress. To expand this base the government has attempted to include representatives of commercial associations, university faculties, labor, students, and other major groups in the ARENA state and municipal organizational structure. This effort is particularly important in view of the lack of popular support for the regime during the past two or three years. President Costa e Silva was elected by Congress as an ARENA candidate, and he has indicated his intention to rely on the party as the source of his civilian support.

MDB leaders stress such issues as undue military influence in the government, the alleged failure of the administration's anti-inflation program, "denationalization" of the economy, and the government's refusal to allow popular presidential and gubernatorial elections. The MDB's position on these issues has gained it considerable support in urban areas, especially among labor, students, and intellectuals. Poor finances and weak organization have hampered the MDB in many rural areas. The ex-Labor Party (PTB) contingent, whose left-of-center policies tend to dominate the party line, is by far the most significant bloc in the MDB. Like ARENA, the party has difficulty reconciling local conflicts and harmonizing personal differences among its members.

The real opposition, partly submerged, partly exiled, and partly incorporated in the MDB, was weakened by the removal from office of many deputies, including virtually all far leftists, soon after the March 1964 revolution. Since the beginning of the Castello Branco administration, it has been restrained

in its actions, primarily to avoid antagonizing the watchful military.

Neither ARENA nor the MDB can be considered a cohesive disciplined entity. Personalism and regional rivalries continue to govern political behavior. A major weakness in the present political party system is that it has been artificially imposed from above, i.e., from the national level down, whereas Brazil's parties traditionally have developed from the grass roots upward, although they have never been based on mass support. The fragility and artificiality of both ARENA and the MDB are obvious from the great difficulty they have had in creating party organizations in the states and municipalities. Although provision has been made for state and municipal party directorates, many in fact do not exist or are inoperative. In many instances politicians and prominent figures have declined to choose between the two parties, either of which would require alliances with people of greatly different political stripe and in many instances with traditional enemies. Political party machinery at the local level remains for the most part independent of the national party structure. Local units are dependent on the personal organization of leaders who ally with ARENA or the MDB out of expediency.

Although each has qualified for official recognition as a result of the November 1966 elections, both ARENA and the MDB are technically "provisional" parties. Permanent parties are to be organized sometime in 1968, and they must satisfy stringent regulations established by the Statute on Political Parties of 15 July 1965.

D. Current Administration

President Arthur da Costa e Silva, who took office on 15 March 1967, is a 64-year-old retired army marshal and former war minister. He is an outspoken, gregarious, shrewd man of action, who tends to be less of an internationalist and intellectual than his predecessor. He was unopposed in the October 1966 presidential election which was held by the Congress but controlled by the military-dominated government.

Costa e Silva inherited an economy in fair condition. Inflation was being curbed and a favorable balance of trade had been achieved. The federal budget deficit, traditionally huge, had been reduced to the point where most of it could be financed by noninflationary means. Government subsidies on consumer items and services had largely been removed, and a serious drain on the national treasury thereby eliminated.

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He faces, however, formidable economic and social problems. A sizable portion of the Brazilian population believes that the government's economic reform programs have failed. Real wages for many workers have declined during the past three years. São Paulo, the industrial center, is in an economic slump blamed primarily on tight government credit policies, a myriad of confusing decrees, and a downtrend in consumer purchasing power. Only a scant beginning has been made in alleviating the problems of the poverty-stricken northeast.

Costa e Silva intends to continue the thrust of Castello Branco's economic and social policies but hopes to "humanize" them. He plans to emphasize impact-type activities such as education, housing, health, and social welfare. In the economic field, he may loosen tight credit restrictions and wage restraints somewhat as a means of priming the economy and gaining wider political support. The president also plans to devote much greater attention to hemispheric affairs than did his predecessor.

Brazil's foreign policy is expected to remain basically unchanged but may move away from the extremely close ties with the US that marked the previous regime and had aroused an adverse reaction. Although an admirer of the US, the president realizes that occasional public divergencies from US views gain him additional popular support. Ties are likely to remain relatively warm, but the style and tactics may indicate greater differences than actually exist. Anti-US agitation has been increasing in many sectors of the population, and many failures have been blamed on an alleged propensity for adopting US solutions to Brazilian problems.

Costa e Silva is acutely aware that his tenure in office depends to a great extent on retaining strong military backing. As a recent ex-war minister and career soldier, the new president is vitally interested in modernizing the armed forces. Severe cuts in Brazil's share of the Latin American military assistance program from the US would result in a distinct cooling in over-all relations. He has included some hard-line officers in his cabinet, probably to maintain close contact with potential rightist dissidents and to counterbalance civilian elements who might press for rapid political liberalization. In choosing officers for his cabinet and his top military adviser, Costa e Silva usually has picked from those staunchly loyal to him and not too closely identified with his predecessor.

Although most Brazilians would prefer a democratically-elected civilian president, they favor him for the present in

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the belief that he will soften the unpopular austere economic programs. Military officers are backing the new regime and hoping for the best, but many seem doubtful that he can continue to govern effectively. The prospects that Costa e Silva can survive his second year in office without a major threat developing to his regime appear good. If he is unable to show substantial economic progress by that time, however, considerable opposition may develop that would force him to adopt a more authoritarian posture in order to retain his position.

E. Foreign Relations

Brazil's principal foreign tie is with the United States with whom relations traditionally have been friendly and marked by close cooperation. Brazil has sought US support in its long rivalry with Argentina for preponderant influence in South America and for protection against any European aggressor. During the Spanish-American War, Brazil was sympathetic toward the United States, and tried to counteract criticism of the Monroe Doctrine in the late nineteenth and early twentieth centuries. Brazil also cooperated with the United States in both World Wars; the Brazilian Expeditionary Force fought along with US forces in Italy in World War II. The United States long has provided the major market for Brazilian coffee and other exports, and this economic bond strengthened as Brazil became more dependent on US financial and technological aid in its ambitious program of economic development. The United States is Brazil's most important customer and source of imports.

After World War II, however, pro-US sentiment was considerably modified by an increase in nationalism. The conviction grew that Brazil was destined to become a world power and, as such, must have an independent foreign policy. Ultra-nationalist and extreme leftist politicians, though not numerous, exercised a disproportionate influence by exploiting widespread social and economic discontent and picturing the United States as mainly responsible for Brazil's difficulties. They argued that to achieve great power status Brazil must develop relations with all the world powers and break out of its "satellite" relationship with the United States.

A new chapter in US - Brazilian relations began in 1964 when the Castello Branco government proclaimed its support for the Alliance for Progress, under which the United States has provided nearly \$1 billion in economic assistance to Brazil alone. This aid has undergirded the government's stabilization and reform efforts, provided a vital foreign exchange margin while the balance of payments was being steadied, and helped to

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direct both government and private investment into lagging sectors such as agriculture and low-cost housing. The government has taken steps to encourage foreign investment and has received favorable responses from US and European companies.

Argentina has long been Brazil's chief rival for prestige in Latin America, and one of Brazil's principal concerns has been to counter Argentina's efforts to expand its influence in Uruguay, Paraguay, and Bolivia. In recent years, however, relations with Argentina have been cordial. Brazil is an important consumer of Argentine wheat in exchange for Brazilian coffee and other tropical products.

Brazil's relations with other Latin American countries have also been generally cordial. Relations with Paraguay are good, although a border dispute over the Guairá Falls (Salto das Sete Quedas) area has not been settled. Relations with Chile have traditionally been warm. In various disputes between Peru and Ecuador, Brazil has played an important conciliatory role. Contacts with Colombia and Central America have generally been friendly but not particularly close or important, except for Brazilian participation with these areas in international coffee agreements. Brazil and Venezuela reestablished diplomatic relations in December 1966 after the election of Costa e Silva; they had been interrupted in 1964 because Venezuela's Betancourt Doctrine opposed the recognition of the Branco administration as a regime brought to power by a coup d'etat.

Brazil's relations with western Europe have been mainly economic and cultural. Denied associate membership in the European Common Market, Brazil has been one of the countries hardest hit by the protectionist policies of the organization and by the preferential treatment granted to African associate members. The United Kingdom, which was the leading foreign investor in Brazil before World War II and still has substantial investments there, has declined from second rank as a trading partner in 1950 to sixth place in 1965. West Germany ranks third after the United States and Argentina as a Brazilian customer and source of imports.

Portugal is regarded with affection as the mother country, from which immigrants have been admitted even when the entry of others was restricted, but many Brazilians disapprove of the Salazar regime. In 1963 Brazil voted for a UN Security Council resolution condemning Portuguese colonial policy. Because of its cultural and historical ties, however, Brazil has a strong feeling of solidarity with Portugal which transcends ideological differences. The present Brazilian government is more pro-Portuguese than many of its predecessors.

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Thus, despite its desire for good relations with the independent countries of Africa, Brazil is giving increased support to Portugal on the question of its Portuguese African territories.

The culture of France is held in high esteem, and renewed French interest in Brazil has been warmly welcomed. France, however, ranks only seventh as a trading partner. Relations are very friendly with Italy, which, with Portugal, has been the main European source of immigrants to Brazil, and in 1965 was the fourth-ranking trading partner. Brazil also maintains diplomatic representation in Vatican City. Brazilians have been critical of the Franco dictatorship, and diplomatic relations between Spain and Brazil, suspended during 1945-50, are maintained on a cool, official basis, although a trade increase is expected.

Relations with Japan have been increasingly cordial in recent years. High-level state visits have occurred, and a Japan-Brazil tax treaty was concluded in early 1967. The main element in Brazilian-Japanese relations has been the immigration, chiefly in the 1920's, of some 200,000 Japanese, who with their Brazilian-born families represent the largest overseas Japanese community. They have settled mainly in São Paulo state and have done much to improve agriculture and are taking an increasingly active part in business. About one-fourth of Japanese investment abroad is in Brazil. Japanese capital has been invested principally in Brazilian steel, shipbuilding, and fisheries; Japan ranks ninth as a Brazilian trading partner.

Brazil has established relations with most of the nations of Africa. Some Brazilians claim that their country, in view of its location and its achievements in racial democracy, is especially qualified to serve as a bridge between those nations and the West. Thus far, however, Brazil has had no significant trade with them and is in competition with them in the world coffee market.

Brazil, supported by majority public opinion, traditionally has opposed the Soviet Union and its policies. Diplomatic relations, not established until 1946, were severed a year later and were not resumed until November 1961. Brazil, however, believing that its traditional markets in the West have become practically saturated with certain of its products, has expanded its trade with the Soviet bloc. Brazil and the Soviet Union concluded a \$100 million credit agreement in 1966 which may facilitate trade. Poland, Czechoslovakia, Hungary, Yugoslavia, Rumania, and Bulgaria maintain diplomatic missions in Brazil, and East Germany has a trade mission. Brazil has no relations

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with Communist China or any Asian Communist country. Members of a Chinese Communist trade mission were expelled from Brazil in 1964 on charges of engaging in subversive activities.

Brazil takes seriously its role as an important power with international interests and obligations. It has participated actively in international organizations, including the Organization of American States (OAS), the League of Nations, the International Labor Organization, and the Permanent Court of International Justice. Since 1946, Brazil has been chosen five times as a nonpermanent member of the Security Council of the United Nations and has participated in UN peace missions in the Middle East, the Congo, and Cyprus.

Brazil has played a leading role as a member of the OAS. It supported the OAS quarantine resolution during the Cuban crisis of October 1962, but under President Goulart advocated a hands-off policy toward Cuba and nonalignment in the Cold War. In 1964, however, the Castello Branco government broke relations with Cuba, basing its action on "Cuba being a Communist regime incompatible with the inter-American system" and "the present Cuban Government's active interference in the internal affairs of Brazil." Brazil contributed troops and leadership for the Inter-American Peace Force during the Dominican Republic civil war in 1965 and has been a leading voice in promoting the creation of a permanent hemispheric defense force. Brazil firmly supports the concept of collective security and generally looks to the OAS as a deterrent to conflicts between member states, advocating OAS rather than UN primacy in keeping hemispheric peace. However, Brazil opposes granting "peaceful settlement" powers to the OAS, fearing that this could reopen old disputes settled by its border treaties.

F. Subversion and Insurgency

1. General

There is no significant active insurgency in Brazil at this time. While subversive or potentially subversive groups exist among both leftist and rightist elements, the people of Brazil are not willing to support any effort which seeks to overthrow the present government through armed revolution. In the two known instances in recent years where guerrilla bands operated in the countryside, the local inhabitants actively aided the armed forces in locating and destroying them.

The armed forces, security services, and police forces are loyal to the government and have energetically sought to eliminate groups and apprehend individuals engaged in subversive activities. At the present low level of insurgency, the forces available to the government are sufficient to prevent the successful establishment of a guerrilla base. The army maintains a good reputation among the people through civic action programs and is continually improving its countersubversive capability. Its counterinsurgency and jungle warfare school located in the state of Amazonas has provided training to 1,600 officers and non-commissioned officers. Recently, due to the insurgency in Bolivia, the army began holding maneuvers in areas of reported guerrilla activity. In the less populous states where rural insurgency might occur, such as in Mato Grosso, Goiás, Amazonas, and the four territories, counterinsurgency efforts are the sole responsibility of the armed forces. In the more developed and populous states, however, the army is assisted by civil and military police organizations in preventing insurgency.

There are several groups in Brazil and in Uruguay which advocate the overthrow of the Brazilian government through armed revolution. These groups, however, do not have the capability to either initiate or maintain rural or urban insurgency. While the Brazilian Communist Party (PCB) has the greatest potential for supporting an insurgency effort, it follows the policy that the "correct" path to power at this time in Brazil is through peaceful infiltration into the country's political and economic systems.

Leonel Brizola's Nationalist Revolutionary Movement, an exile organization headquartered in Montevideo, Uruguay, has most actively attempted to establish armed insurgency in Brazil recently. The guerrilla groups which have appeared, however, have been embryonic and lacking in popular support even in the immediate area of operations.

There are increasing indications that subversive groups believe that the states of Mato Grosso and Goiás are the most suitable areas for the initiation of rural insurgency. Both states are remote and have sufficient resources to support a guerrilla band.

2. Brazilian Exile Groups

There are concentrations of Brazilian exiles who oppose the present Brazilian government in Uruguay, Chile, Mexico, Cuba, Bolivia, and France. Of the approximately 400 known exiles about 200 are in Uruguay, and only in Uruguay have they

organized into active groups. There are three such groups: a. the Nationalist Revolutionary Movement (MNR); b. the Nationalist Armed Resistance (RAN); and c. other exiles, including former labor leaders oriented primarily to the PCB and followers of former President João Goulart. Only RAN and the MNR can be considered insurgency-oriented.

a. Nationalist Revolutionary Movement (MNR)

Among the various groups opposing the existing government, Leonel Brizola's National Revolutionary Movement is regarded as the most active. Since his exile to Uruguay in 1964, Leonel Brizola has sought power through armed insurgency. Brizola claims to have attempted to initiate subversive activity six times in Rio Grande do Sul alone, but there have been only two instances where the efforts actually amounted to guerrilla operations. Under Brizola's sponsorship in March 1965, 15 men attacked state police outposts in Rio Grande do Sul. The group was captured after a three-day chase ending in the state of Paraná. In April 1967, a group of approximately 40 of Brizola's men was discovered in the national park in the Serra do Caparaó on the Minas Gerais and Espírito Santo state border. The guerrilla band operated clandestinely for approximately five months before it was eliminated by the Brazilian security forces. The captured guerrillas revealed that Brizola's group had planned the operation, had furnished money, weapons, personnel, and training (in Uruguay and Cuba), and had established a rudimentary support mechanism centered primarily in the state of Guanabara.

The MNR receives support from Brazilian ultranationalists as well as from disaffected members from other leftist groups, particularly within the states of Guanabara and Rio Grande do Sul. The hardcore membership is in Uruguay where it has an established organization and is assisted by three lieutenants: Paulo de Abreu Romero Schilling Schirmer is political advisor; ex-federal deputy José Guimarães Neiva Moreira is in charge of Brizola's international contacts and liaison; and former Army Colonel Dagoberto Rodrigues is Brizola's military advisor. Former federal deputy Max da Costa Santos, who is in exile in Paris, acts as the European contact for MNR supporters travelling to Cuba via Prague for guerrilla and other training.

Brizola has arranged a degree of "protection" for himself and his organization in Uruguay by developing close relations with various Uruguayan politicians and government officials. He also enjoys good contacts with revolutionary groups in that country, such as the Eastern Revolutionary Movement (MRO), the Leftist Liberation Front (FIDEL), and the Uruguayan Communist

Party (PCU). Brizola has always been faced with a shortage of trained Brazilian personnel willing to endure the dangers and hardships faced by guerrillas. This has led him to maintain contacts with Uruguayan and Paraguayan guerrilla groups as potential sources of men.

Brizola also receives Cuban financial support and regularly sends members of the MNR to Cuba for training. Despite this, he steadfastly maintains his unwillingness to accept Cubans as members of his guerrilla bands, probably fearing that he would lose control of his organization. He has stated several times that he intends to achieve power through Brazilian efforts alone.

Brizola's insistence that he must be sole commander of any operation has placed him at loggerheads with other Brazilian groups and has contributed to his failure to obtain unanimous support even among the Brazilian exiles in Uruguay.

b. Nationalist Armed Resistance (RAN)

This group, centered in Montevideo, Uruguay, and formerly known as the Movement of Nationalist Military Resistance (MRMN), is composed almost exclusively of former military men who fled to Uruguay and who for various reasons are not willing to accept Brizola, a civilian politician, as leader. The group came into existence through the efforts of Admiral Candido da Costa Aragão, commanding officer of the Brazilian marine corps at the time of the March 1964 revolution and one-time president of the Organization of Brazilian Exiles in Uruguay. Aragão became titular leader of what eventually became known as RAN, but actual leadership was exercised by ex-Army Colonel Emmanuel Nicol and former Air Force Captain Alfredo Ribeiro Daudt. Though RAN talks about launching armed insurgency and committing terrorist acts against Americans, they have yet to take action along these lines.

RAN has few members. The majority of exiles favoring insurgency join the MNR. RAN also has been unsuccessful in obtaining significant support from either the Cubans or the Chinese Communists. In September 1967, Aragão reportedly sought financial assistance while visiting Cuba and Red China.

c. Other Exiles

Two other exiled leaders might foster insurgency in Brazil. One is Miguel Arraes de Alencar, deposed governor of Pernambuco, who is currently alternating his place of exile between France and Algeria. He derives his popular support primarily from the

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Brazilian northeast. Arraes has not been as forthright as Brizola in declaring his position on armed revolution and does not enjoy as prominent a position in revolutionary circles. He tries to exercise influence in the purely political sphere, such as in the "Broad Front" recently formed by Carlos Lacerda, Juscelino Kubitschek, and João Goulart. The extent, composition, and effectiveness of his organization is not known. Recent reports indicate that he offered sizeable monetary support to Leonel Brizola and to Carlos Marighela, a former PCB leader. Arraes' source of funds is unknown, but it might be Algeria.

The second leader of potential importance is Francisco Julião Arruda de Paulo, who is currently in exile in Mexico. He is an ex-federal deputy and former leader of the defunct Peasant Leagues in northeast Brazil. Prior to the overthrow of Goulart's government he advocated violent revolution as the only road to social readjustment in Brazil and received Cuban support.

3. Brazilian Communist Party (PCB)

The Brazilian Communist Party (PCB) follows the Soviet line and is the largest disciplined revolutionary group in Brazil. In 1966, it numbered approximately 13,200 according to the PCB leadership.

The PCB was founded in 1922 and has been illegal except for a brief period between 1945 and 1947. The party has always exerted an influence far greater than its relatively small membership would suggest. It received encouragement from Vargas, from Kubitschek, and especially from Goulart. During the terms of these three presidents (1950-64), the Communists were able to infiltrate the labor movement reportedly in return for their support in election campaigns and in organizing political strikes and demonstrations.

The PCB has an organization in each of the Brazilian states, reliable funding mechanisms, document procurement capabilities, experienced leadership, a wide range of members, and most importantly, established links with the USSR from which supplies, funds, advice, and international political support are obtained. The PCB, however, in keeping with the current Soviet policy toward Brazil, has consistently refused to attempt any rural or urban insurgency. The CPSU has informed the PCB that the USSR would not provide paramilitary training to any PCB members at this time. Moreover, the PCB has vigorously condemned Cuba for supporting armed revolutionary groups in various Latin American countries without first obtaining the concurrence of the local CP.

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In spite of the position of the PCB leadership and the approval of that policy by the CPSU, one faction within the party remains unhappy with inactivity in the insurgency field. Carlos Marighela, a member of the Central Committee and Executive Commission until he was expelled from the PCB in September 1967, was the leader of the pro-insurgency faction. He was expelled for attending the Latin American Solidarity Organization (LASO) conference held in August 1967 in Havana without the Party's permission. Marighela claims that the ruling by Party General Secretary Luiz Carlos Prestes that conditions are not "correct" for armed revolution condemns the Party to a stagnant position. Two other Central Committee members as well as several state level leaders have also been expelled for supporting Marighela's position.

The importance of Marighela's expulsion from the PCB will depend on the number of his supporters who follow him from the Party. Marighela enjoyed sizable Party support in the states of São Paulo and Guanabara. The PCB believes that Marighela already has been involved in establishing insurgency groups. He has contacts with Cuba, with Leonel Brizola, with Miguel Arraes, and possibly with elements of the dissident Chinese-line Communist Party of Brazil (CPB). One of Marighela's primary concerns is to find a foreign patron to replace the USSR.

4. The Communist Party of Brazil (CPB)

The Communist Party of Brazil (CPB) was formed in 1962 from a dissident element of the PCB. It estimated its membership in 1966 at 1,000, and follows the Chinese line, advocating wars of national liberation. Three or four groups of CPB members, totalling at least 30 men, have received three to six months training in rural and urban insurgency in Communist China. Nearly all of these trainees, who were to act as a training cadre upon their return, presumably now are in Brazil.

The CPB suffers from a number of weaknesses which prevent it from creating a guerrilla force. Party membership has not grown to any significant size, and it has not recovered from the numerous arrests in late 1966 which disrupted its organization in the states of Goiás, São Paulo, Mato Grosso, and in Brasília. The Party also experiences internal dissension between the national level leadership. The "old guard" who originally established the CPB want to concentrate on organizational expansion; the younger secondary leaders call for immediate radical action.

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5. The Popular Action (Ação Popular - AP)

The AP is a radically leftist student group estimated to have 2,000 members which until recently has been effective in arranging anti-American and anti-government student demonstrations. It has a well-trained leadership cadre which at the national level remains virtually unknown. By January 1967, the AP had reached an advanced organizational stage which enabled it to initiate a country-wide recruitment drive. In February, however, it was dealt a severe, but perhaps temporary, blow when over 20 of its leaders in the key state of Guanabara were arrested and interrogated by the Brazilian security services. This may account for the AP's lack of success in mounting student demonstrations as well as its failure to cause disturbances when there were legitimate student grievances. Armed revolution is an intrinsic part of the AP doctrine, but the organization is not known to have an insurgency program. If the AP does initiate insurgency, it would probably take the form of urban terrorism. Much about this organization is speculative. As yet there is no detailed knowledge concerning its funds, extent, or sophistication. There are unconfirmed reports that the AP in São Paulo has established links with Brizola and Carlos Marighela and indications of its possible involvement in an effort to establish a rural insurgency group at Itauçu, Goiás.

6. Workers' Politics (POLOP)

A second group active mainly in student politics is POLOP, loosely translated as Workers' Politics. This group is close to, although probably not formally allied with, the dissident CPB. POLOP, formed in 1960, is a loose grouping of Marxist intellectuals who believe that Brazil can be saved only through a violent revolution based on a student-worker alliance. They do not appear to have an insurgency capability at this time.

7. The Trotskyite Groups

The Trotskyite movement, which has existed in Brazil since 1938, appears to have its greatest support in the state of São Paulo and in the northeastern states. Never a unified movement in Brazil, its diverse groups such as the Revolutionary Workers' Party (POR) and Revolutionary Workers' Party/Trotskyite (POR/T), together probably have less than 500 members. Traditionally oriented toward preparing and leading peasant revolts, they have been most consistently blamed for attempts at isolated acts of terrorism and sabotage. Their most notable success occurred in the port of Santos when POR/T for a short period organized a slowdown among the port workers, an operation which

was popularly called "Operation Turtle." Due to their small numbers, lack of effective national organization, poor funding channels, and limited popular support, their primary value is as a source of recruits for already-established insurgency groups.

8. Paraguayan Exiles

Another organization within Brazil with insurgency potential is a group of approximately 30 Paraguayan exiles led by Colonel Lorenzo Abel Arrua. It is located in the states of Mato Grosso and Paraná. Though this group currently is loyal to the Oscar Creydt faction of the Paraguayan Communist Party (PCP), Arrua is also in contact with Marighela and Brizola. The PCP is insurgency-oriented and has established guerrilla training camps in Mato Grosso.

9. The Role of Cuba

Although Cuba is the most active supporter of insurgency in Latin America, there has been little or no confirmed evidence of Cuban subversive efforts in Brazil since the rupture in diplomatic relations between Brazil and Cuba in May 1964. The PCB, the organization in Brazil with the best potential for supporting guerrilla activity, refuses to support Cuban-backed insurgency for the time being and has strongly and openly condemned Fidel Castro for supporting independent guerrilla efforts in Latin America which do not have the approval of the local Communist Party. The clearest indication of Cuba's involvement is its support of Leonel Brizola's group of exiles. Cuban couriers contact and fund Brazilian insurgents in Uruguay and finance their travel to Cuba for training in guerrilla warfare.

The presence at the recent LASO conference of at least three prominent members of various Brazilian insurgency groups has been confirmed. They were Carlos Marighela, José Anselmo dos Santos, who claimed to represent the MNR but who also reportedly represented the AP, and Aluísio Palhano Pedreira Ferreira, permanent member of the LASO Organizing Committee. It has also been reported that Candido Aragão, the RAN leader, visited Cuba shortly after the LASO conference ended.

The existence of a support mechanism or escape and evasion net within Brazil for use by the guerrilla group in Bolivia was recently discovered. Contact procedures and names and addresses in Porto Alegre, and possibly Cuiabá in Mato Grosso were found in a guerrilla cache in Bolivia.

10. The Rightists

Another potential threat to the Brazilian political structure lies on the right. There are several loose rightist political groupings, differing in basic motivations and tactics, but at times sharing common interests and capable of collaborating on at least a limited basis.

Strongest of the rightist political elements are the so-called "hard-line" military officers, both active and retired, who are uncompromising in their hostility to the men and institutions of the pre-revolutionary regime and intent on preventing a repetition of the pre-revolutionary political experience. The most reactionary element consists of several habitual plotters, most of whom are retired army and navy officers. The most forceful element, however, is a largely reformist and idealistic group of younger active duty officers, most of whom are colonels or majors. Both of these elements provided the pressures behind Castello Branco's various moves toward authoritarianism, and they continue to exert some pressure under President Costa e Silva.

Various disgruntled economic interests (e.g., wealthy coffee planters, large landholders, and some industrialists), alienated by economic reforms which they consider erosive of their privileged positions, are another potential rightist threat to the regime. In the past, certain of these interests have joined forces with leftist nationalists to bring about protectionist legislation. Nationalism is also a potential bridge between them and the military.

Former Guanabara Governor Carlos Lacerda, an active oppositionist for most of the past two decades, is probably the political figure currently most dangerous to the regime. He is a clever opportunist with close ties to conservative and reactionary business interests as well as connections with hard-line military officers. In September 1967, under the sponsorship of former Presidents Kubitschek and Goulart, he established a "Broad Front" opposition organization whose objective is "to defend and demand rights cancelled since April, 1964." By wooing these pre-revolutionary forces, however, Lacerda may increasingly lose support from the conservative sectors, both civilian and military, where his strength traditionally has lain.

11. Recent Insurgency Incidents

a. Rio Grande do Sul Guerrilla Incident

In March 1965, 15 uniformed and lightly armed men seized state police outposts in three small towns in Rio Grande do Sul.

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They were civilian residents or former residents of the state of Rio Grande do Sul (RGS) led by ex-Army Colonel Jefferson Cardim de Alencar Osório and former RGS military police sergeant Alberi Vieira dos Santos. The group was pursued for three days across the states of Rio Grande do Sul, Santa Catarina, and Paraná by army elements supported by aerial surveillance and state police communication facilities. Thirteen members of the guerrilla band were captured and two killed. One soldier was killed. The police in the towns briefly occupied by the guerrillas offered no resistance and actually cooperated with the band in several instances. However, the army received strong support from the local citizenry who consistently provided information which kept the government posted on the guerrilla band's activities and direction of travel. Under interrogation both Osório and dos Santos admitted that the guerrilla operation had been planned and supported by Leonel Brizola. After the capture of the first town, Osório was to make a radio announcement in Brizola's name that the "counterrevolution" had been launched. Once the announcement was made, simultaneous preplanned uprisings were to occur in several towns in Rio Grande do Sul which would add to the momentum of the armed rebellion. The plan foundered when the uprisings did not occur.

b. The Serra do Caparaó Guerrilla Group

In November 1966, Brizola initiated a second and much more sophisticated effort to establish a base in Brazil. He placed a guerrilla group within the national park in the Serra do Caparaó, in the southeastern portion of the state of Minas Gerais along the common border with the state of Espírito Santo. On 23 March 1967, a squad of Minas Gerais military police, investigating the latest in a series of reports which the local populace had been making since January 1966, captured two guerrillas who were on a reconnaissance patrol. By mid-April a combined force of approximately 1,100 army, air force, and military police from Minas Gerais and Espírito Santo captured 19 members of the 40-man guerrilla group. Subsequently, five more, who were part of the guerrillas' support group, were arrested. Eighteen weapons were seized during the operation. At the time the arrests were made, the guerrilla band had completed its training phase and was awaiting orders from Brizola to launch attacks in the area.

The guerrilla band was recruited, organized, trained, funded, and directed by Brizola. It consisted primarily of former enlisted men who had been expelled from the military services in March 1964. Some had been former members of either the PCB or CPB, and all had long records of involvement in

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revolutionary activities; at least five members of the band had been involved in the Rio Grande do Sul incident of 1965. Eight of the 19 captured guerrillas received their training in Cuba. The others had been trained on Brizola's property at Pando, Uruguay.

The guerrilla support unit was located in Guanabara and was run by Professor Bayard Demaria Boiteux, former president of the Brazilian Socialist Party. He maintained direct contact with Brizola in Uruguay. Boiteux had responsibility for organizing and supporting insurgency activity in the states of Guanabara, Rio de Janeiro, southern Minas Gerais, and the western portion of Espírito Santo. Amadeu de Almeida Rocha was the contact man between Boiteux and the guerrilla band in the Caparaó, and supplied it with money, recruits, medicine, and instructions from Brizola. The band was commanded by former Army Sergeant Amadeu Felipe da Luz Ferreira, who stated under interrogation that Brizola had expended US \$30,000 provided by Cuba on the Caparaó effort.

c. The Uberlândia Terrorist Group

On 30 July 1967, federal police arrested eleven men in the town of Uberlândia, in the state of Minas Gerais, on charges of involvement in terrorist activities. Quantities of explosives, incendiary chemicals, and weapons were also captured. Interrogation of those arrested implicated the Brazilian journalist Flávio Aristides Freitas Tavares, who in turn confessed that he had been recruited by a member of the Uberlândia group in late 1966 to contact Leonel Brizola on their behalf. In January 1967, Tavares met twice with Brizola and arranged for a guerrilla warfare instructor to travel to Minas Gerais. In mid-February the instructor contacted Tavares in Brasília and was shortly thereafter introduced to the Uberlândia group. Apparently the group never became sufficiently organized to undertake terrorist actions.

The Uberlândia group, which had existed since 1965, was composed primarily of civilians from Minas Gerais. Several members previously belonged to the PCB and CPB but broke with them because of the parties' inactivity. There have been no indications that the Uberlândia group had links with any other subversive group.

d. Itaçu Insurgency Group

In August 1967, Goiás state military police uncovered an attempt by Popular Action (AP) to undertake rural insurgency. Eighteen farm workers and Marcos Costello Panzera, a member

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of the state committee of the AP, were arrested in the Itauçu area, located west of the Federal District of Brasília. The AP, using the Basic Education Movement sponsored by the National Conference of Bishops as cover, was giving a series of three-day courses in revolutionary doctrine and the preparation of simple explosives for use against local landowners. It was discovered, subsequently, that in addition to Panzera two other AP state committee members were involved and that similar classes were being given by AP members in at least six other towns. It is not clear how long the AP has been involved in this form of activity in Goiás. Panzera revealed that there are three AP cells operating in the state of Goiás -- one involved in rural insurgency and the other two responsible for raising funds and recruiting city workers. It appears that this was an AP effort with no ties to any other insurgency group.

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VI. Economy

A. General

Brazil, although basically an agricultural country, has built an impressive industrial sector in a relatively short period of time. Industry and agriculture each contribute about 28 percent to Gross Domestic Product (GDP).

The vast stretches of Brazil's potentially good tropical and subtropical farmland afford a wide range of agricultural possibilities. In addition to being the leading world producer and exporter of coffee, Brazil is a major producer of cocoa, cotton, beans, rice, and corn and has one of the largest livestock inventories in the world. Brazil also possesses vast forest resources, very large mineral deposits (especially iron ore), and extensive hydroelectric power resources. The country's main resource deficiencies are high-grade coal and petroleum. In spite of this diversified and extensive resource base, Brazil remains a poor country. Average per capita income is only about \$250, and, because of the inequality of the distribution of the country's wealth, a large majority of the population receives much less than the average.

In the 1950's, Brazil enjoyed a period of sustained economic growth, achieving an annual average increase in GDP of 6 percent from 1950 to 1961. This growth took place mainly in the industrial sector under the stimulus of heavy public investments and a substantial inflow of foreign private capital and technology. In 1962, however, the rate of economic growth slowed, and in 1963 it fell to 1.6 percent largely as a result of unsound economic policies that led to a spiraling inflation and large deficits in Brazil's balance of payments.

Following the 1964 revolution, the Castello Branco government endeavored to establish a new basis for sustained economic growth under a comprehensive economic stabilization program. During 1964-66, under this program government deficits were reduced, the country's balance of payments was improved, and the rate of inflation was lowered from 87 percent in 1964 to 41 percent in 1966. The rate of economic growth averaged only 3.8 percent in 1964-66, failing to reach the government's target largely because of the program's curbs on imports and credit. The new Costa e Silva government, installed in March 1967, apparently intends to continue the stabilization program but with greater emphasis on accelerating economic growth and less on restraining inflation than under the Castello Branco government.

B. Agriculture

About one-half of Brazil's labor force is employed in agriculture, and branches of industry processing agricultural commodities dominate the manufacturing sector. Exports of agricultural commodities -- coffee, cocoa, sugar, cotton, and tobacco -- are the source of about 80 percent of Brazil's foreign exchange earnings.

The most important crop produced in Brazil is coffee, which occupied more than 11 percent of total land under crops in 1965 and represented 51 percent of total export earnings in the years 1960-65. Cultivation of coffee is concentrated in the southern states of Paraná and São Paulo. Coffee was the moving force in agriculture until the late 1950's, when surplus production and declining international prices led to government policies stressing diversification. In 1966, the federal government introduced a new program to eradicate coffee trees and encourage their replacement with food crops. This program has met with limited success, resulting in the removal from production of some 625 million trees by March 1967 (the equivalent of about 5 million bags of coffee).

Cotton is one of the most important crops in Brazil. In 1965 raw cotton exports were 0.2 million metric tons, representing about 6 percent (\$96 million) of total export earnings. There are two distinct areas of cotton production in Brazil, the South and the Northeast.

Brazil produces about one-third of the world output of cocoa, most of which is produced in the state of Bahia. Both production and exports of cocoa dropped during the period 1960-65 but, encouraged by the recovery of world prices, production increased 6 percent in 1966 to 171,000 metric tons with exports of 134,000 metric tons.

Sugarcane is the fourth most valuable crop grown in Brazil, and the country ranks fourth in the world in the production of sugar. Production of sugarcane has risen rapidly in the last decade in response to growing domestic and export demand. Exports of sugar (raw) averaged 0.6 million metric tons annually during 1960-65 and reached a record of 1.0 million metric tons in 1966, accounting for about 4 percent of export earnings (\$80 million).

Brazil is self-sufficient in most foodstuffs except wheat. The principal domestic foodcrops are corn, rice, beans, manioc, peanuts, and wheat. Small amounts of these

crops (with exception of wheat) have been exported in recent years. Wheat is the major food import. During the period 1960-65, Brazil produced an average of 0.6 million metric tons of wheat annually, while yearly imports of wheat averaged 2.1 million metric tons.

Since 1964, the government has given increased attention to the long-neglected agricultural sector. Short-run measures to promote agricultural production and improve the financial returns to farmers have included improved farm credit, minimum prices for agricultural products, and increased technical assistance. The long-run approach to agriculture involves the breaking up of large estates and colonizing government lands as provided in the Agrarian Reform Law of 1964. Implementation of the law, so far, has been limited to the completion of a land survey (in 1966).

C. Manufacturing

Brazil has the most highly developed industrial complex in South America and leads all other South American countries in the volume of industrial output. Manufacturing has been the fastest growing sector of the economy since World War II, registering an average annual increase of nearly 10 percent in the period 1956-62. In 1963-64, manufacturing output stagnated, and in 1965 it declined as a result of reduced demand and curtailed imports under the government's economic stabilization program.

The development of manufacturing has been spurred by the ready availability of labor and many industrial raw materials and by the presence of an enterprising class of industrial leaders. Industrial expansion for the domestic market has been limited, however, by the lack of a nationwide market as a result of inadequate transportation facilities, wide regional disparities in wealth, and the fact that a large segment of the population is outside the money economy. Moreover, excessive tariff protection has minimized business competition, resulting in high costs and poor quality.

The most highly industrialized area of the country is the triangular area formed by the cities of São Paulo, Rio de Janeiro, and Belo Horizonte. Manufacturing is made up largely of the production of consumer goods, of which food products and textiles are the most important. The output of intermediate products and capital goods also has grown rapidly since 1955. Brazil has made major strides in expanding the output of lumber, paper products, chemicals, motor vehicles, iron and steel, and machinery and equipment.

The output of motor vehicles, for example, rose from less than 31,000 units in 1957 to 225,000 units in 1966. Brazil has developed the largest iron and steel industry in Latin America, accounting for about 35 percent of the total Latin American steel production. In 1966, Brazil produced 3.7 million metric tons of steel ingots. Brazil has about 30 producers of heavy industrial machinery. A broad range of products is produced, including equipment for steel furnaces and rolling mills and the complete production of turbines, steam generators, transformers, and electric power equipment.

D. Fuels, Power, and Mining

Brazil ranks fifth in the world in hydroelectric power potential, but its reserves of solid fuels are small. Proved resources of coal, mainly bituminous and generally of poor quality, are estimated at 2.2 million metric tons. Production of coal was 3.1 million metric tons in 1965. Domestic production of crude oil -- 34 million barrels in 1965 -- supplied only about one-third of total consumption and was supplemented by imports of 76 million barrels of crude oil in 1965. Brazil ranks fifth among Latin American countries in the production of electric power (33.7 billion kilowatt hours in 1966) and in installed capacity (8.3 million kilowatts in 1966). Approximately three-fourths of installed capacity is in hydroelectric installations. Despite the considerable progress since 1960 in expanding capacity, demand has continued to exceed supply, causing repeated shortages and frequently necessitating the rationing of consumption.

Brazil has extensive mineral resources, the most important of which are iron ore, manganese, and minerals used in the production of nuclear energy. Other significant deposits include bauxite, copper, lead, and nickel. Only a small portion of the mineral potential of the country is exploited. Mining contributed about 2 percent to GDP in 1964. The development of mining has been impeded by the inaccessibility of deposits, the lack of domestic capital, and governmental discouragement of foreign investment -- a policy that has been reversed since 1964.

E. Investment, Finance, and Banking

Throughout the post-war period the rapid growth of the Brazilian economy was the result of sizeable capital investment by both public and private sectors and a large inflow of foreign capital (more than \$100 million annually in the period 1950-61). In the years 1955-63, gross investment

averaged about 16.5 percent. The private sector (including autonomous government enterprises) has accounted for the larger proportion of investment since 1955, with its share ranging from a low of 60 percent to a high of 80 percent of the total. In the late 1950's and continuing into the 1960's, manufacturing and electric power facilities and roads have been the principal recipients of investment outlays. The major share of direct foreign investment in Brazil has been concentrated in manufacturing. At the end of 1965, US private investments in Brazil totalled approximately \$1.1 billion, of which \$0.7 billion was in the manufacturing sector.

The budget of the federal government is the dominant element in Brazilian financial policy. The history of the federal budget from the early 1950's until 1963 has been one of rapidly growing expenditures unmatched by corresponding increases in revenues. By 1963 only 66 percent of expenditures were covered by revenues. The rapid growth of expenditures was the result of a number of factors including large public investment expenditures and the subsidization of inefficient government-owned autonomous enterprises.

Under the 1964-66 economic stabilization program, federal budgetary deficits were greatly reduced as tax rates were raised, tax administration was improved, and expenditures were brought under tighter control. In 1966 approximately 90 percent of expenditures were covered by revenues. Moreover, the inflationary effects of the deficits were reduced by financing them to a larger extent with the sale of bonds to the public instead of borrowing from the banking system.

The banking system of Brazil consists of the Central Bank (created in 1964), 320 commercial banks, and 45 branches of foreign banks. Specialized national banking and credit institutions that supply credit in agriculture, industry, and for the development of basic facilities such as transportation, ports, and power plants include the National Bank for Economic Development, the Amazon Credit Bank, and the Bank of the Northeast. Significant supplementary sources of credit include savings banks and social security institutions. In addition, substantial credit resources are channeled through approximately 300 finance companies, some of which are subsidiaries of commercial banks.

F. International Economic Relations

Export earnings, which in 1965 were the equivalent of 7 percent of GDP, have not been a major factor in the growth

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of the Brazilian economy since the mid-1950's. Throughout most years of the post-war period, Brazil's foreign trade has been characterized, with few exceptions, by an excess of imports over exports. These trade deficits resulted from Brazil's failure to expand exports through diversification, from falling world market prices for traditional exports, and from its failure to devalue the cruzeiro as rapidly as domestic prices rose. Beginning in 1964 under the economic stabilization program, however, the new government sought to increase exports, to reduce imports, and to achieve a realistic exchange rate. The success of the government's policy is evidenced by the sharp improvement in the country's foreign trade balance, which registered surpluses in the three year period 1964-66. The trade surplus in 1966 was about \$245 million.

Brazil's export trade is dominated by coffee, which in 1965 accounted for 44 percent of total export earnings of \$1,596 million. Other foodstuffs exported include cocoa and sugar, which together represented 6 percent of total exports in 1965. Exports of industrial raw materials -- cotton, iron ore, timber, and manganese ore -- rank second after foodstuffs, accounting for 18 percent of total exports in 1965. Exports of manufactures, which in 1963 were valued at only \$38 million or 3 percent of total exports, rose to an all time high of \$110 million in 1965 or about 7 percent of total exports.

Brazil's imports (\$1,096 million in 1965) are predominantly capital goods, intermediate industrial products, and industrial raw materials. These three categories represent about two-thirds of the total value of imports. Remaining imports consist primarily of miscellaneous manufactures and foodstuffs.

The US is Brazil's most important trading partner. In 1965 the US share of Brazil's total trade was 31 percent. West Germany ranks second to the US among Brazil's trading partners in terms of both exports and imports. Brazil's other important West European trading partners include France, Italy, Belgium-Luxembourg, the Netherlands, and the United Kingdom. Brazil's trade with other members of the Latin American Free Trade Association (LAFTA) has increased rapidly, rising from \$195 million in 1960 to \$388 million in 1965, equal to 14 percent of Brazil's total trade in 1965. Trade with Communist countries in 1965 amounted to \$153 million or 6 percent of the total value of Brazil's foreign trade. The share has not changed significantly during the 1960's.

Brazil has experienced severe balance of payments difficulties since the late 1950's, but in the period 1964-66

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the country recorded three consecutive balance of payments surpluses. These surpluses have been due primarily to large trade surpluses, supplemented by a moderate recovery of foreign private investment and by drawings on foreign credits extended by the US, international lending institutions, and private lenders. Public debt service payments are a heavy burden on the balance of payments; in 1967 they will amount to \$350 million or some 20 percent of export earnings.

Brazil has been the largest recipient of foreign economic assistance in Latin America. Total commitments of foreign aid from the US and international institutions in the form of grants and loans (excluding balance of payments support) totalled \$3.1 billion from 1946 to 1965. These commitments represented nearly 25 percent of the total economic assistance extended to Latin America from these two sources.

G. Prime Economic Targets

The principal strategic economic targets in Brazil are the major urban concentrations. There are seven strategic target areas -- São Paulo, Rio de Janeiro, Belo Horizonte, Porto Alegre, Salvador, Recife, and Brasília. With the exception of Brasília, all of these target areas are Brazil's major concentrations of industry, commerce, port facilities (excluding Belo Horizonte), telecommunications, and transport terminals. The São Paulo area, for example, (including the port of Santos) is the most highly industrialized area in the nation as well as the country's commercial-financial center. Moreover, Santos is one of the nation's two principal ports (the other is Rio de Janeiro). The São Paulo-Santos area contains several electric power and metallurgical plants, a petroleum refinery, most of Brazil's automobile plants, and numerous other manufacturing establishments producing a wide range of products including machinery and equipment, chemicals, textiles, paper, and shoes.

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3. Conselho Nacional de Estatística. Anuário Estatístico do Brasil, 1966, Rio de Janeiro, 1966. U.
4. International Bank for Reconstruction and Development. Current Economic Position and Prospects of Brazil, vol I, May 1965. C.
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VII. Transportation

A. General

The huge size and physical diversity of Brazil make construction of well-integrated networks of highways and railroads extremely difficult. Well over a million automobiles, trucks, and busses travel the highways, and the number is steadily increasing (see Figure 120). In spite of the growing importance of motor vehicles, however, animal-drawn vehicles are still used to a considerable extent for farm-to-market transportation in the rural interior (see Figure 121). Pack animals -- mules and burros -- are widely used where terrain conditions and lack of roads preclude the use of motor vehicles (see Figure 122). Most of the thousands of miles of navigable inland waterways are confined to the sparsely settled Amazon Basin. Coastal shipping, while still an important transportation link between large population centers along the Atlantic coast, has been plagued by gross inefficiencies and is overloaded by the rising demands of the Brazilian economy. Air transportation has developed rapidly, partly because of the inadequacies of the other forms of transportation, and now handles much of the country's commercial passenger traffic.

B. Roads and Trails

1. Roads

a. Extent and Characteristics

Most of the 300,000 or more miles of roads in Brazil are confined to the southern and eastern sections of the country, with concentrations in the states of Guanabara, Rio de Janeiro, São Paulo, and Minas Gerais (see Table 5 and Maps 54734 and 55736). Large areas of the interior are virtually without roads. Amazonas, for example, with over 600,000 square miles of territory, contains fewer than 170 miles of roads.

The quality of the roads ranges from excellent to terrible -- from a magnificent four-lane highway linking São Paulo and Santos to rough tracks that serve as roads in many sections of the rural interior (see Figures 123 through 126). Less than 10 percent of the total road mileage consists of paved roads, and practically all of these roads are concentrated in the south and east along or near the coast. São Paulo has more than twice as many paved roads as any

Table 5

Road Mileage in Brazil
January 1964

<u>State or Territory</u>	<u>Mileage</u>	<u>State or Territory</u>	<u>Mileage</u>
São Paulo	64,020	Paraíba	6,621
Minas Gerais	46,002	Rio Grande do Norte	5,357
Paraná	43,724	Maranhão	3,110
Rio Grande do Sul	34,258	Alagoas	2,986
Goiás (including the Distrito Federal)	19,188	Pará	2,857
Mato Grosso	11,994	Sergipe	2,326
Bahia	19,889	Rondônia	736
Santa Catarina	19,362	Guanabara	638
Piauí	13,412	Amapá	600
Rio de Janeiro	10,491	Acre	175
Pernambuco	9,956	Amazonas	168
Espírito Santo	8,414	Roraima	143
Ceará	8,129	Fernando de Noronha	25
Total			<u>334,581</u>

other state in Brazil. Many of the roads -- even the paved ones -- are poor, especially in terms of base preparation, and are frequently in need of repair. Because modern equipment and experienced road crews are scarce, much of the maintenance work must be done by primitive methods. Some 4,000 miles of existing or proposed roads are scheduled for paving during the next few years.

Over 500 bridges on the principal highways of Brazil are more than 20 feet long. Most of these are of reinforced concrete and are generally in good condition (see Figure 127). Off the main highways are many low-capacity timber bridges badly in need of repair or replacement, as well as numerous fords and ferry crossings. Small hand-propelled craft capable of carrying no more than one or two vehicles are commonly used as ferries on secondary routes in the interior (see Figure 128). Steep approaches limit the use of many ferry landings to jeeps or similar vehicles. Tunnels are relatively few on the highways of Brazil, and most of them are in or near urban areas. Five are on the superhighway between São Paulo and Santos.

b. Numbering Systems

The road system comprises federal, state, and municipal roads. Federal highways are designated by the initials BR followed by a number, as BR-10 and BR-222; state highways are designated by the initial letters representing the state followed by a number, as PR-72 and MT-28 (for Paraná Highway 72 and Mato Grosso Highway 28); and municipal roads, constituting more than 75 percent of the total road mileage, bear no letter or number designations. The current numbering system for federal highways was adopted only recently. Table 6 lists the new and old numbers of selected federal highways.

Federal highways form the basic network of the country's road system. Under the new numbering plan, Brasília has taken the place of Rio de Janeiro as the central point for the system. Federal highways are divided into four categories: radial, longitudinal, lateral, and diagonal. The radials, consisting of highways radiating from Brasília and also highways in the remote frontier regions, are numbered from 001 to 099; the longitudinal highways run north and south and are numbered from 100 to 199; the lateral or transverse highways run east and west and are numbered from 200 to 299; and the diagonal highways are numbered from 300 to 399.

Table 6

New and Old Numbers for Selected Federal Highways in Brazil.*

<u>New Numbers</u>	<u>Old Numbers</u>	<u>New Numbers</u>	<u>Old Numbers</u>
10	14	262	31
40	7	267	34
50	33	277	35
60	19	290	37
70	30	293	38
101	5	304	53
116	2, 4, 13	316	26
135	3	324	28, 39
153	14	364	29, 31, 33, 56
156	15	369	87
222	22	374	34
226	14	381	55
230	23	416	30
232	25	456	33
235	27	471	92
242	28		

*Highways represented by new and old numbers are not necessarily coterminous; BR-10, for example, represents only a segment of old BR-14. Map 54734 shows the new numbering system for the "Centro-Norte" side but the old numbering system for the "Centro-Sul" side.



Figure 120. Heavy traffic in downtown São Paulo. Note the motor scooters on the safety island in foreground and the large diesel-powered busses.



Figure 121. A horse-drawn wagon or carreta in a rural area of Paraná. These wagons have been a characteristic means of transportation in southern Brazil since the latter part of the last century, when they were introduced into the country by settlers from the Ukraine.

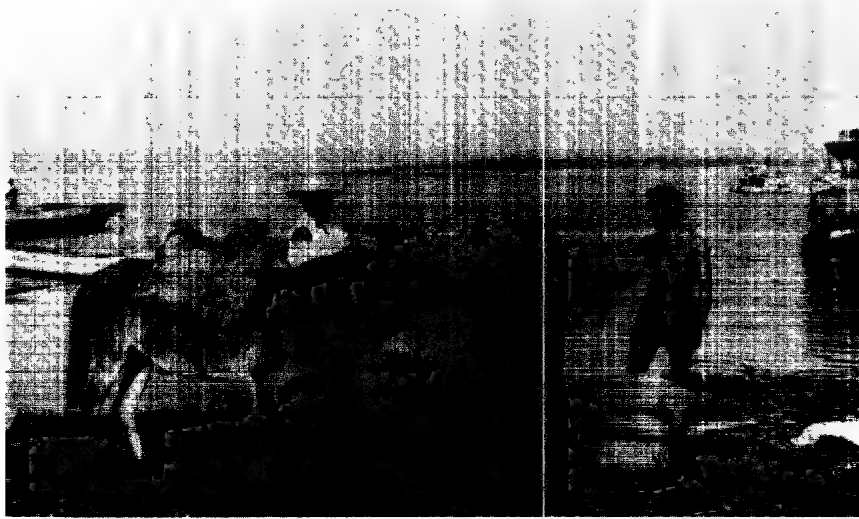


Figure 122. Donkeys that are used to transport goods from river to town at Marabá on the Rio Tocantins in the state of Pará.

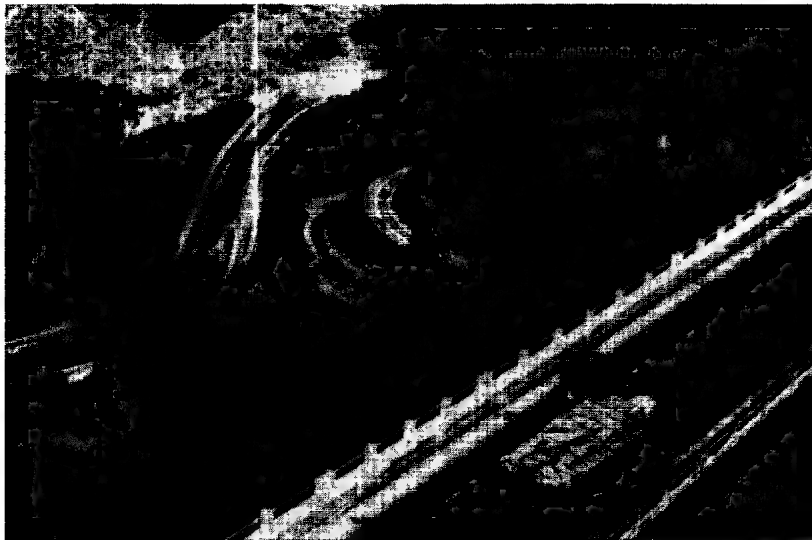


Figure 123. The Via Anchieta (BR-50) winding up the steep Serra do Mar escarpment between Santos and São Paulo. This is one of the best and most heavily used highways in Brazil.

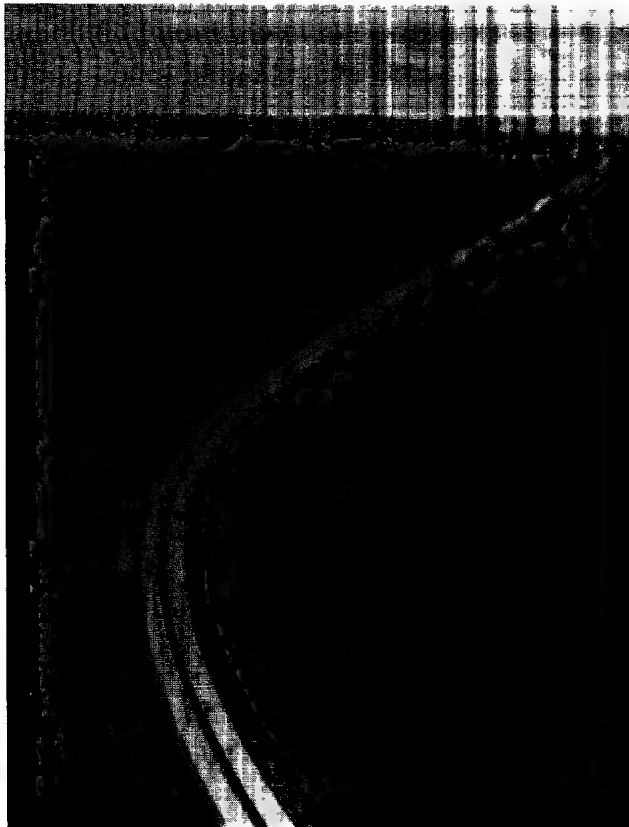


Figure 124. A flat stretch on BR-50, the superhighway between Santos and São Paulo.

Figure 125. A typical red clay road through a wooded area of Paraná near Foz do Iguaçu. Although soft and mucky when wet, such roads dry quickly to a hard surface under the heat of the sun.





Figure 126. Car stuck on a sandy road in the Northeast. Road construction in this region has increased in recent years but, because of a lack of funds, paving is reserved only for high-priority roads.

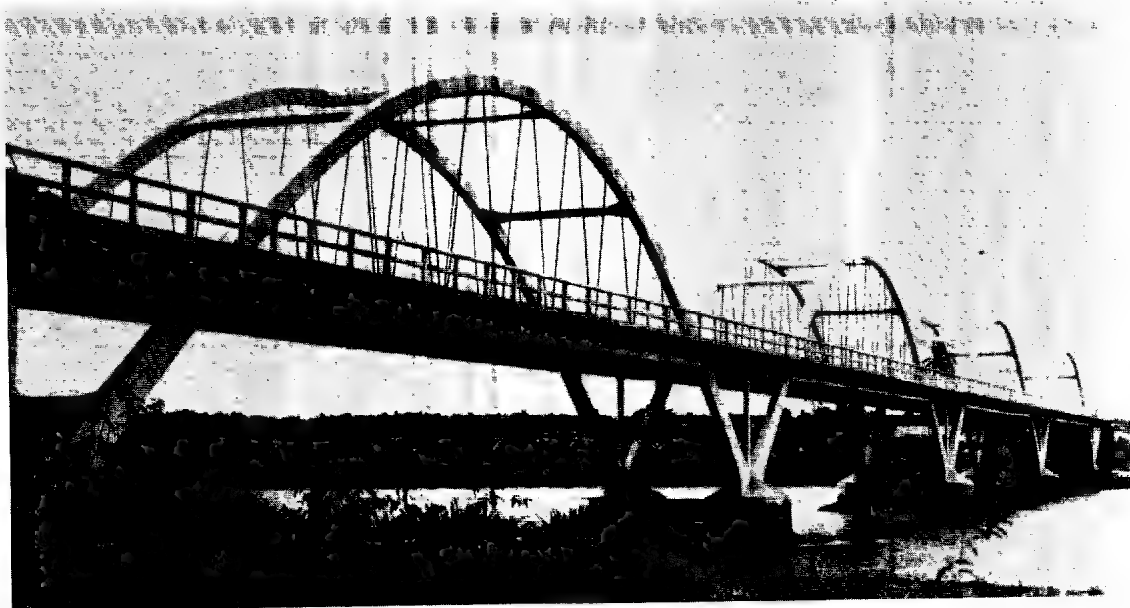


Figure 127. A concrete arch bridge near Aracaju in the state of Sergipe.



Figure 128. A primitive ferry in central Mato Grosso.

c. Regional Networks*

(1) Northeastern Region

Highway transportation is still only poorly developed in the Northeastern Region of Brazil. Of approximately 70,000 miles of roads in the region, no more than 1 percent are paved. Unpaved state and municipal roads account for the greatest part of the road mileage, and they are frequently unusable by cars or even by trucks in the wet season. During the balance of the year many of the rutted dirt roads are so rough that very few automobiles venture onto them. Stretches of unconsolidated sand are also common on many of the unpaved roads of the Northeast, and in some places the sand is so deep and soft that the roads frequently become impassable (see Figure 126).

Practically all of the paved roads in the Northeast are federal highways. The two principal longitudinal highways serving the region are BR-101 and BR-116. BR-101 connects the cities and major towns along the coast from Natal southward to Salvador. It is fully hard surfaced along this stretch and, by standards of the Northeast, sustains very heavy traffic, especially in and near the larger and more active urban centers such as Recife.

BR-116 extends southward from Fortaleza on the northeast coast all the way to Jaguarão on the Uruguayan frontier. Within the Northeastern Region the road traverses an arid land of cactus and scrub vegetation, and most of the highway is unpaved except for asphalt surfaces near Fortaleza in the north and Feira de Santana in the south. A major bottleneck on the route is the ferry crossing of the Rio São Francisco near Belém de São Francisco. The closest bridges over the river are near Petrolândia about 60 miles downstream and at Juazeiro more than 100 miles upstream.

Lateral and diagonal roads from the seaports run inland across the narrow coastal plain and on to the arid plateaus and hills of the interior, forming interconnections between BR-101 and BR-116. Typically, they are paved for only the first 100 miles or so inland from the coast. The most important of these roads are BR-230 from João Pessoa to

* The regions mentioned in this chapter are defined in Chapter III, Physical Geography.

Ipaumirim, BR-232 from Recife to Salgueiro, BR-316 from Maceió to Petrolândia, and BR-235 from Aracaju to Canudos. BR-304 joins BR-116 to connect the ports of Fortaleza and Natal.

(2) Eastern Region

The roads of the important states of Guanabara, Rio de Janeiro, São Paulo, Minas Gerais, and Espírito Santo are by far the best developed in the country. The principal longitudinal highway, BR-116, continuing southward out of Feira de Santana, is paved throughout its length in the Eastern Region and is the main highway between the North-eastern and Eastern Regions. About 1,500 vehicles -- mostly trucks and busses -- use this road daily. A paved highway, BR-324, connects the port of Salvador with BR-116 at Feira de Santana.

The coastal highway, BR-101, continues southward, but is still largely unpaved, and much of the stretch between Euriópolis and Helvécia is incomplete. Construction of roads running inland from the coastal highway is restricted by the rugged terrain rising behind the coastal plain. BR-415, extending inland from the port of Ilhéus, is one of the few roads connecting BR-101 with the main longitudinal highway, BR-116, in the northern part of the Eastern Region. Farther to the south, the section of BR-101 extending from the port of Vitória to the environs of Rio de Janeiro is paved and sustains heavy traffic.

The heart of the Brazilian highway system is formed by the triangle of federal highways between Rio de Janeiro and Belo Horizonte (BR-135), between Belo Horizonte and São Paulo (BR-381), and between São Paulo and Rio de Janeiro (BR-116). BR-135 from Rio de Janeiro to Belo Horizonte and BR-40 from Belo Horizonte to Brasília are paved highways of the Pan American Highway system and form the principal route to the new national capital. The segment of BR-116 from São Paulo to the environs of Rio de Janeiro, together with the short highway BR-462 leading into the city, is known as the Carretera Presidente Dutra. It is one of the most heavily traveled routes in the entire country. Over 7,000 trucks, busses, and automobiles use it daily, and it is currently being converted into a dual highway in order to cope with increasing traffic.

(3) Southern Region

The road network of the state of São Paulo is so well developed that one can travel over good roads to any large town in the state on an almost straight line from the city of São Paulo. In addition to the hard-surfaced federal highways, many miles of state highways are paved. Good lateral roads are still relatively few, however, and considerable backtracking is necessary when traveling between smaller towns near the state borders.

BR-50, connecting São Paulo with the seaport of Santos, is a dual-lane superhighway that handles a large share of Brazil's imports (see Figures 123 and 124). Known as the Via Anchieta, this short highway zigzags through very rugged terrain. Five tunnels as well as numerous bridges and viaducts are encountered on the route.

Although the Eastern Region and the northern part of the Southern Region contain the best roads in Brazil, unusually heavy rainfall sometimes makes them almost unusable. In January 1966, for example, much of the road network of the state of Rio de Janeiro was blocked or destroyed by heavy rainfall. The section of BR-116 between São Paulo and Curitiba, the capital of Paraná, is frequently interrupted by earthslides and cave-ins caused by heavy rains and improper drainage.

In southern Brazil, poor road conditions related to heavy rains and a lack of paved surfaces severely limit highway usefulness (see Figure 125). During the unusually heavy rains of the winter of 1962, traffic was completely disrupted on highway BR-277 between Curitiba and Foz do Iguaçu, a town in the Brazil - Paraguay - Argentina triborder area. On one section of the road, 300 trucks remained stuck in the mud for 10 days and passenger bus traffic was maintained only with the help of tractors.

Improvements of the road system of southern Brazil in recent years have included the development of trunk highways and access roads to supplement the region's railroads and inland waterways. The mileage of all-weather roads in Rio Grande do Sul has increased from less than 300 in the late 1930's to well over 5,000 at present. There are two distinct radial road networks, one focusing on Porto Alegre and connecting that port with the agricultural hinterland of the valley of the Rio Jacuí, and the other converging on Pelotas and Rio Grande and providing access to the pastoral frontier zones of the west and the far south. Connections between the two networks are afforded by the hard-surfaced

Pôrto Alegre-Pelotas highway, BR-116.

(4) Northern and West-Central Regions

Apart from the road networks of the regions described above, namely the Northeastern, Eastern, and Southern Regions, the only areas in Brazil with roads numerous enough to be considered networks are in the southern parts of Goiás and Mato Grosso. The road nets of these areas consist mostly of unpaved, fair-weather roads, but construction of hard-surfaced roads has increased in recent years. Highways are paved in the area immediately southwest of Brasília, for example between Anápolis and Goiânia (BR-060), and eventually there will be paved highway connections southward all the way to São Paulo.

Cuiabá is the hub from which the principal roads of the state of Mato Grosso radiate. BR-364 runs southeastward out of Cuiabá to São Paulo and northwestward to Pôrto Velho on the Rio Madeira. Other roads connect Cuiabá with Cáceres and the town of Mato Grosso, and plans call for a long road northward out of the city to Santarém on the Amazon.

One of the most notable transportation developments in Brazil has been the opening of the 1,400-mile Trans-Brazilian Highway, from Brasília to Belém. This pilot road, linking the new capital with the mouth of the Amazon, represents a major step toward integration of the country's markets. Manufactured goods from the industrial south now move northward along a good highway while rubber, rice, jute, and other products from the Amazon Basin move southward. The road has also opened vast new areas of the interior for settlement. Although work is continuing, the highway has been traversable most of the time since late 1959. Heavy rains in 1964 interrupted traffic for well over a month, but subsequent improvements make it unlikely that excessively long interruptions will recur. Between 500 and 800 vehicles use the highway daily, according to current reports.

2. Trails

The distinction between roads and trails in Brazil is often difficult to make. Many of the "roads" are merely jeepable tracks. Dirt roads in areas subject to heavy rains and erosion often deteriorate to the point that they are usable only by pack animals. Away from the densely populated areas the road net becomes increasingly tenuous, and foot-paths and saddle trails supplant roads and highways. Instead of trucks or other motor vehicles, the prime movers are

oxcarts, saddle horses, and pack trains. Man himself serves as a beast of burden in remote areas of the interior.

Throughout much of the Amazon Basin, where canoes and other watercraft are by far the most common means of transport, almost the only "roads" are the estradas or narrow trails cut by the gatherers of rubber and brazilnuts. These trails start from the gatherer's house, which is usually in a clearing on a riverbank, and follow tortuous courses of perhaps 5 miles or more in length through the adjacent forest before returning to the starting point by the river. In some cases, a number of trails may fan out from a riverside clearing, and each may have brazilnut trees, rubber trees, or tonka bean trees situated singly or in small groves along its course. An average of 100 rubber trees per trail is common. Keeping the trails clear is a never-ending task, and abandoned paths are quickly overgrown and reincorporated into the surrounding jungle. In many areas the trails are usable only during the dry season.

In addition to the estradas, short Indian trails scattered through the forest connect navigable streams or lead to remote villages away from the larger watercourses. These damp trails, undetectable from the air, wind like tunnels through the dense tropical vegetation. In following them, one may have to hack through hanging vines or obstructing branches, cross narrow log bridges or ford rivers, and climb steep, slippery streambanks.

Seismic prospecting crews searching for oil several years ago hacked out numerous trails in the central basin of the Amazon, but these have probably been completely grown over by now. Typically, one of these trails extended inland from a riverbank for about 12 miles in a straight line, cut over at a right angle for 3 miles, and then made another right-angle turn back to the river. Sizable areas have been covered by this trail pattern, especially in the vicinity of Manaus, where oil-bearing shale seemed to hold the most promise for commercial exploitation.

In some areas game trails provide the best avenues for movement. These are often very well defined. For example, the area about the upper Rio Xingu in Mato Grosso is crisscrossed by game trails that are so well worn that they appear to be man made. They remain flooded for a period after a heavy rain and at such times may be seen from the air, glistening in the sun, for long distances.

C. Railroads

Railroads carry about half of Brazil's freight traffic and a large part of its suburban passenger traffic (see Figures 129 and 130). They total nearly 23,800 miles in length, practically all of which is concentrated in the Northeastern and Southern Regions (see Map 55736). More than half of the total route mileage is confined to the states of Minas Gerais, Rio de Janeiro, São Paulo, and Rio Grande do Sul. The northwestern two-thirds of Brazil contains only a few short isolated rail lines.

The overall network comprises 36 poorly integrated railroad systems using six different gauges. The greatest part of the total route mileage is in meter gauge, and the remainder is in broad (5'3"), standard (4'8-1/2"), and narrow gauges. Slightly over 1,000 miles are electrified. More than half of the railroads, in total route miles, were constructed before World War I, and most of the track is in poor condition. Diesel-electric units have gradually replaced many of the old steam locomotives during the past two decades, but much antiquated equipment continues in use.

Most of the railroads are operated by the Federal Government or -- especially in the case of São Paulo -- by the state governments; very few remain in private hands. In spite of this centralization of control, coordination between the lines is poor and most lines operate at a considerable loss. Hundreds of miles of uneconomical branch lines adversely affect the whole system. Many of the short lines are used only once a day by trains that carry no more than a dozen passengers and a few crates of chickens.

1. Northeastern Region

The railroads of the Northeastern Region are practically all meter-gauge, single-track lines, mostly focused on the coastal ports of São Luís, Fortaleza, Natal, Cabedelo, Recife, Maceió, Aracaju, and Salvador. Although constituting roughly 20 percent of the railroad network of the country, these lines absorb only about 5 percent of the rail traffic. Sugar and coffee are the principal commodities transported.

Efficient operations are difficult to achieve within this region because of the great seasonal fluctuations in business; the workload is about twice as heavy in November as in July. Most of the freight travels in only one direction,

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to the ports, and many trains return to their points of origin practically empty. Elimination of some of the little-used branch lines has reduced the annual deficits incurred by the railroads in the area, but it has also left many small communities without adequate means of transportation with the rest of the country.

Some of the railroads of the Northeast penetrate the mountainous interior, but most of them are confined to the valleys and coastal plains. The major physical barrier within the region is the Rio São Francisco, which the railroads bridge at only two places -- between Propriá and Porto Real do Colégio near the mouth of the river, and between Juazeiro and Petrolina farther upstream.

The three most important railroads of the Northeast are the Federal Eastern of Brazil Railway, the Northeast Railway, and the Cearense Railway. These railroads serve the ports of Salvador, Recife, and Fortaleza, respectively.

2. Eastern Region

The railroad network of the Eastern Region, the most populous and most highly industrialized region of the country, carries by far the greatest amount of traffic. Much of the region is mountainous and rugged, so many of the railroads are characterized by steep gradients and sharp curves. Meter-gauge lines predominate in terms of track mileage, but broad-gauge tracks are used on the more important lines.

The only rail link between the important Eastern Region and the Northeast is formed by a combination of lines of the Federal Eastern of Brazil Railway and the Central of Brazil Railway. From Salvador a line of the Federal Eastern of Brazil Railway extends southwestward through the state of Bahia to Monte Azul in northern Minas Gerais. There it meets the main trunkline of the Central of Brazil Railway running from Monte Azul to Rio de Janeiro via Belo Horizonte. Traffic between the two regions over this route, however, is comparatively light.

Density of the railroad network is greatest within two zones of the region -- one extending inland from Rio de Janeiro, and the other extending inland from Santos and São Paulo. The most important line in the first of these zones is the broad-gauge trunkline of the Central of Brazil Railway between Belo Horizonte and Rio de Janeiro. It sustains very heavy traffic -- mineral ores for the steel mills at

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Volta Redonda and coffee, cattle, and lumber destined for Rio de Janeiro.

The principal railroad serving the second zone is the broad-gauge line of the Santos - Jundiaí Railway, which connects the seaport of Santos with the great industrial center of São Paulo and the rich agricultural country beyond. This line surmounts the most formidable natural obstacle in the region, the Serra do Mar escarpment, rising behind the coastal plain (see Figure 131).

Of the several rail lines between the two zones, the most important is a broad-gauge line of the Central of Brazil Railway, which branches off the main trunkline out of Rio de Janeiro. It follows the basin of the Rio Paraíba do Sul southwestward to São Paulo and thus connects the country's two largest cities.

3. Southern Region

The railroads of the states of Paraná, Santa Catarina, and Rio Grande do Sul in southernmost Brazil support a considerable traffic in cattle, lumber, and agricultural products. The entire network is made up of meter-gauge lines. Much of the country traversed by the railroads, especially in southern Rio Grande do Sul, consists of flat to rolling terrain. Most of the eastern section of the Southern Region, however, is very rugged, and sharp curves and steep gradients are common on the rail lines.

The principal railroads of the region are the Rio Grande do Sul Railway, the Paraná Railway, and the Dona Cristina Railway. The trunklines of the first two interconnect to form the major rail route between the Southern Region and the dense network of the Eastern Region. Within the Southern Region, this route extends from São Paulo southwestward to Santa Maria in the state of Rio Grande do Sul and thence eastward along the valley of the lower Rio Jacuí to Porto Alegre. Branch lines of the Rio Grande do Sul Railway south of Porto Alegre make international connections with Uruguay at Barra do Quaraí, Quaraí, Santana do Livramento, and Jaguarão, and with Argentina at Uruguaiana.

When completed, a line parallel to and east of the Rio Grande do Sul Railway, to be known as the Principal Southern Trunk, will form a better link between the Southern and Eastern Regions. It will extend from the port of Rio Grande to Brasília via São Paulo, and a branch line will connect it with the now isolated Dona Cristina Railway of eastern Santa

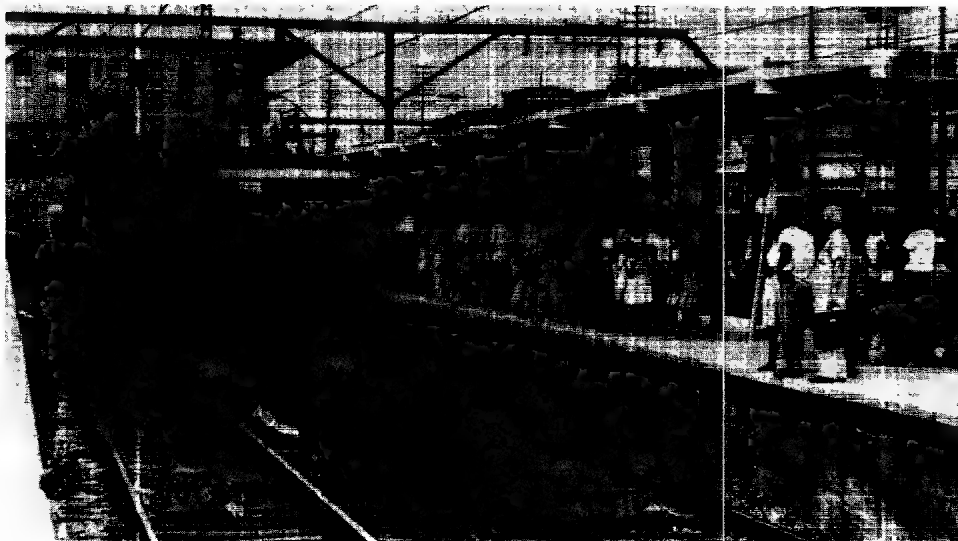


Figure 129. Madureira Station in Rio de Janeiro on the electrified Central of Brazil main line.



Figure 130. Passenger train in the state of São Paulo.

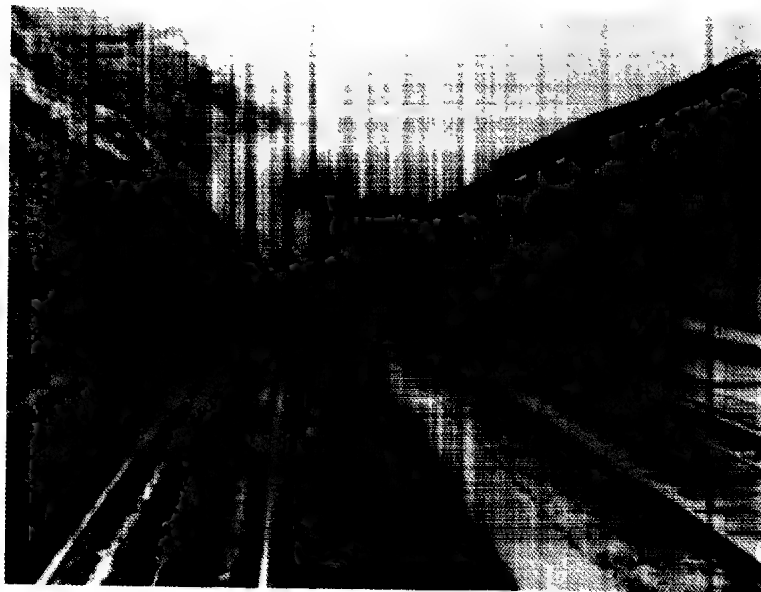


Figure 131. One of two funicular railroads ascending the Serra do Mar escarpment between Santos and São Paulo on the Santos - Jundiaí Railway. Note the cables.

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Catarina state. The Dona Cristina is used mainly to carry coal to the port of Imbituba (Henrique Lage) for shipment northward to the consuming centers of São Paulo and Rio de Janeiro.

4. Northern and West-Central Regions

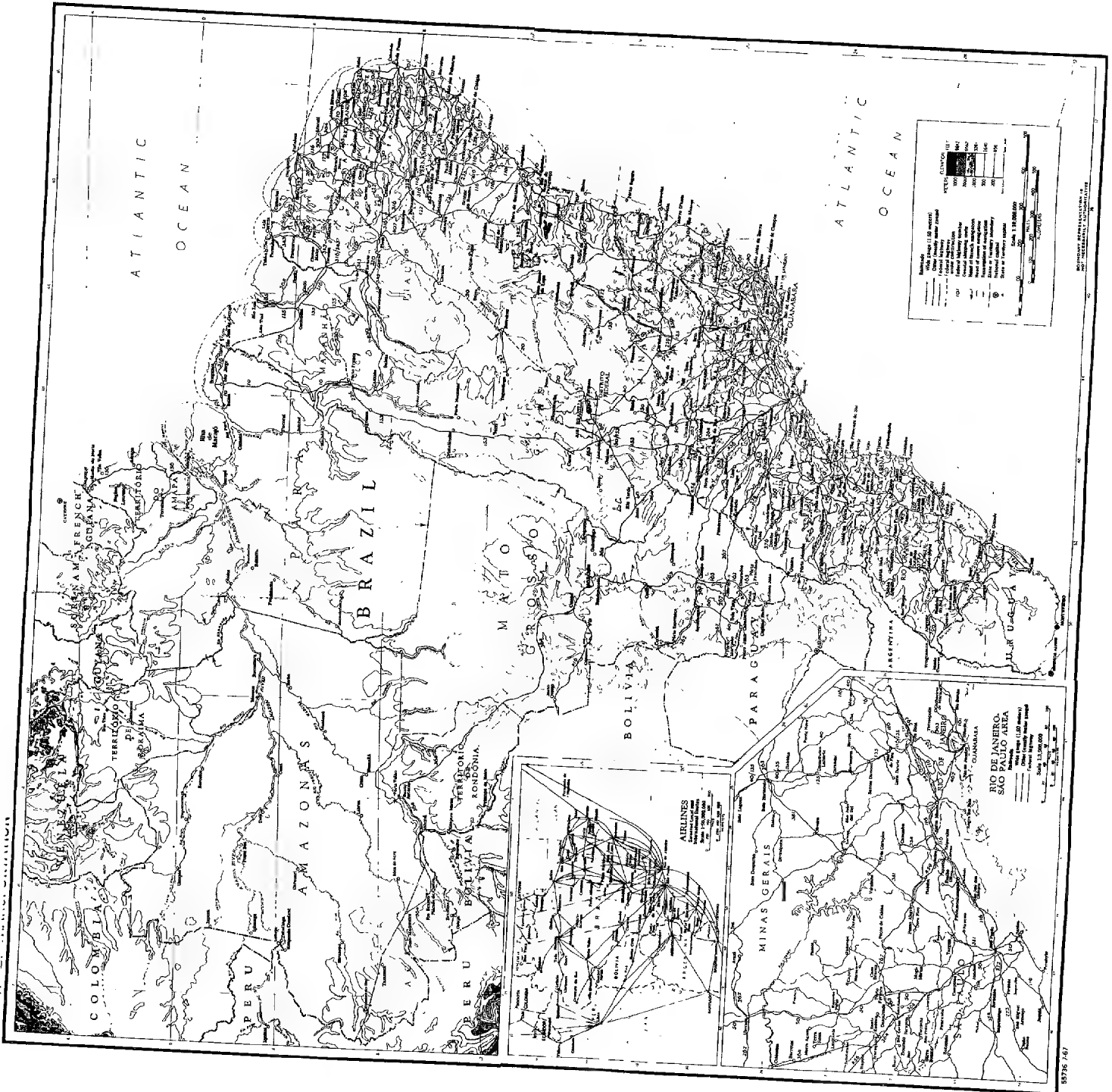
Few railroads in Brazil extend very far inland from the comparatively dense network along the Atlantic coast. An exception is the 840-mile line from Bauru in central São Paulo to the river port of Corumbá on the Rio Paraguai at the Bolivian border in Mato Grosso. This trunkline of the Northwestern of Brazil Railway continues across the border to Santa Cruz, Bolivia, and is the only railroad joining the two countries. Control of the Corumbá - Santa Cruz section has only recently (1964) been transferred from Brazil to Bolivia. If an additional section in Bolivia between Santa Cruz and Cochabamba is ever finished, it will complete a coast-to-coast rail route from Santos (Brazil) to Arica (Chile).

A second rail connection with Bolivia may sometime be established at Guajará-Mirim, the southern terminus of the Madeira - Mamoré Railway. This 227-mile railroad was built to circumvent the rapids of the Rio Madeira so that produce (mostly rubber) could be transported to Pôrto Velho for shipment downstream to the Amazon. It was once planned to bridge the Rio Mamoré and extend the rail line to Riberalta, Bolivia, but the idea has long since been abandoned. In fact, it is quite possible that the uneconomical Madeira - Mamoré Railway itself may soon be abandoned because of its inability to compete with a newly constructed highway (BR-364) serving the same area.

D. Inland Waterways

Brazil has a large number of navigable rivers, but most of them are inland and few provide connections between the long coastline and the interior. Inland waterways are, nonetheless, important supplements to the country's road and railroad systems (see Map 55736). Throughout much of the Amazon Basin they provide the only practical means of surface transportation. The Amazon River itself is navigable to oceangoing ships as far upstream as Iquitos, Peru, and smaller vessels navigate many miles of tributary rivers and streams. Even more important in amount of traffic carried is the system of rivers and lakes serving the rich cattle and grain country of southernmost Brazil. Other significant waterways are the Rio São Francisco, which connects central

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and northeastern Brazil, and the Rio Paraná with its tributary, the Rio Paraguai, in southwestern Brazil.

Vessels of many sizes and types, from dugout canoes to large freighters, ply the inland waterways (see Figures 132 through 135). Over 200 ships of the national merchant marine, as well as numerous vessels under foreign flags, regularly use the country's navigable rivers and lakes. Stern-wheelers, power launches, tugboats, and barges are all common on the larger rivers, whereas canoes, rafts, and other small craft are used everywhere -- on the narrow headwater streams as well as on the great rivers.

1. The Amazon and Its Tributaries

The vast complex of streams in the Amazon system constitutes roughly two-thirds of the navigable inland waterways of Brazil. Petroleum, rubber, timber, fiber, nuts, cotton, rice, cacao, cattle, and hides are shipped downstream, while processed foods, manufactured goods, and building materials are transported upstream.

The most important ports of the Amazon system are Belém, Porto Santana, and Manaus. Belém, situated at the southeastern edge of the Amazon Delta on the broad estuary known as the Rio Pará, is a major transshipment point for river, coastal, and trans-Atlantic traffic (see Figure 134), and probably will be increasingly important now that the new Trans-Brazilian Highway from Brasília has been completed.

Porto Santana, on the northwestern side of the Amazon Delta, is notable mainly as an export point for manganese (see Figure 135). Its facilities include a huge floating wharf and a conveyor belt system for loading ore. The manganese ore is brought to the port from Teresinha, some 120 miles to the northwest, by a standard-gauge rail line.

Manaus, on the Rio Negro -- the major left-bank tributary of the Amazon -- is the largest inland river port of Brazil. Floating pontoon wharves, stationary piers, and bankside wharves provide berthing for oceangoing ships as well as riverboats. Located some 1,000 miles upriver from the Atlantic, the port serves as the principal distribution point of the central Amazon Basin. Ten miles from Manaus, the only Brazilian oil refinery in the Amazon Basin processes crude oil shipped in from Peru and Venezuela.

In addition to the large river ports, there are numerous minor ports and primitive landings along the Amazon and its

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tributaries. Some of the landings are at small villages, but others are no more than riverside clearings in the forest where firewood is obtained by the wood-burning steamboats.

Moving downstream on the Amazon from the Peruvian border, the principal right-bank tributaries are the Rio Juruá, Rio Purus, Rio Madeira, Rio Tapajós, Rio Xingu, and Rio Tocantins; and the principal left-bank tributaries are the Rio Içá, Rio Japurá, Rio Negro, Rio Nhamundá, and Rio Trombetas.

The Rio Juruá and the Rio Purus, with headwaters reaching southwestward into Peru, are exceptionally winding. The Juruá is navigable to small motor launches throughout its course in Brazil during the high-water season (January to May) and large riverboats can reach Eirunepé 800 miles upstream from the juncture with the Amazon the year round. The Rio Purus is navigable throughout its entire length in Brazil and for a considerable distance into Peru by small launches the year round. During high water, large steamers can reach Bôca do Acre over 1,200 miles upstream from the Amazon, and small oceangoing vessels can go as far as Lábrea, about 750 miles upstream from the Amazon. Rubber and brazil-nuts are the main local products transported on the Juruá and the Purus.

The Rio Madeira is the largest of the Amazon's navigable tributaries. During the high-water season (November through July) oceangoing vessels of 6,000 tons can reach Pôrto Velho some 660 miles upstream from the juncture with the Amazon (see Figure 136). River steamers operate on this stretch throughout the year. Upstream from Pôrto Velho, the river is navigable for only a short distance to Santo Antônio; continuing upstream beyond Santo Antônio, navigation is interrupted by over 200 miles of rapids. It is these rapids that necessitated construction of the Madeira - Mamoré Railway, which serves as a bypass for traffic moving to and from the Amazon. Navigable water above the rapids extends far into Bolivia.

The next major right-bank tributary of the Amazon downstream from the Madeira is the Rio Tapajós. Beyond a rather restricted entrance this river broadens to an incredible maximum width of 10 miles. Within about 160 miles of the mouth, however, it narrows sharply, and extensive rapids prevent navigation beyond 175 miles from the mouth for all but shallow-draft vessels. During the high-water season (January to May) launches and other small powerboats can navigate the entire length of the Tapajós and far up its principal tributary, the Rio Juruena,

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into northern Mato Grosso. Santarém, at the mouth of the Tapajós, is a commercial center handling rubber, cattle, cacao, and other forest and agricultural products. Farther upstream are the rubber plantations of Belterra and Fordlândia (about 30 and 100 miles, respectively, from the juncture with the Amazon). Oceangoing vessels can reach Belterra the year round.

The Rio Xingu flows into the Amazon through two narrow channels around a group of low islands near the head of the Amazon Delta. The lower portion of the Xingu, beyond the entrance channels, is very broad but, like the Rio Tapajós, the river narrows sharply upstream. Unnavigable rapids divide the river into two sections: one extending from the mouth for about 130 miles upstream, the other extending above the rapids for almost 680 miles to the northern border of Mato Grosso. The lower section is used by shallow-draft vessels throughout the year; the entire upper section is navigable to small craft only during the wet season (January to May). The Xingu serves a sparsely settled area and is used primarily by rubber gatherers and Indians (see Figure 137).

The Rio Tocantins discharges into the broad Rio Pará, which forms the southeastern margin of the Amazon Delta. The lower reaches of the river are encumbered by numerous small islands and shoals, and certain upstream sections contain extensive rapids. During the high-water season (January to May), however, the Tocantins is navigable to small craft for over 1,000 miles -- to a point less than 100 miles from Brasília. Oceangoing vessels ascend the river to Cametá (see Figure 138), about 30 miles upstream from the juncture with the Amazon. The Rio Araguaia, a major tributary of the Tocantins, provides almost 1,000 additional miles of navigable water for small craft. The principal cargoes moved on the Tocantins and the Araguaia are brazilnuts, cocoa beans, and agricultural produce (see Figure 139).

The Rio Içá, flowing out of Colombia where it is known as the Rio Putumayo, is the first major left-bank tributary of the Amazon, going downstream. The Içá is navigable by large riverboats for its entire course in Brazil and well into Colombia throughout the year. It has no ports -- only a few small trading posts scattered along the banks -- but is significant as the main supply route for the Brazilian military frontier garrison at Ipiranga.

The Rio Japurá also flows out of Colombia. It discharges into the Amazon through a vast network of inter-connecting channels and seasonal lakes. The river is navigable to large boats throughout its course in Brazil,

but navigation in Columbia is interrupted by rapids about 45 miles from the border. The Brazilian frontier post at Japurá (Vila Bittencourt) is supplied by means of the river.

The Rio Negro is by far the largest and most important of the Amazon's left-bank tributaries (see Figure 140). It forms a part of the Orinoco - Casiquiare - Negro inland waterway route between Ciudad Bolívar (Venezuela) and Manaus (Brazil). Except for one stretch where a 40-mile portage is necessary, the entire route of over 1,800 miles is navigable to small craft. Large steamers can ascend the Negro for about 450 miles from Manaus to the small port of Tapurucuará. With the aid of tows through the worst rapids, power launches can navigate the entire course of the river in Brazil.

The largest tributary of the Rio Negro is the Rio Branco. The Branco is navigable to shallow-draft vessels throughout its length in Brazil except at low-water periods (January and February). During the high-water season (May to September) large riverboats ascend over 200 miles to Caracará in the cattle country of northern Roraima Territory.

The Rio Nhamundá joins the Amazon by several sinuous channels that lace the low, marshy floodplain characteristic of the left bank of the great river. It is navigable to canoes over most of its course, but larger vessels probably operate only on the lower reaches of the stream.

The Rio Trombetas and its tributaries provide the sparsely settled north-central area of Brazil with some 400 miles of seasonally navigable waterways. Traffic is light, but shallow-draft steamers do ascend the main river for nearly 130 miles above its mouth.

The remaining left-bank tributaries of the Lower Amazon -- the Paru, the Jarí, and lesser streams -- have relatively narrow channels encumbered with shoals and rapids and are generally suitable only for canoe transportation except in their lower courses.

2. The Rio São Francisco and Other Rivers of the Northeast and East

Below the Amazon the next important river flowing to the Atlantic is the Rio São Francisco. Most of the rivers discharging into the ocean between these two are navigable only during the rainy season and then only by shallow-draft vessels. Rainfall in this area is so variable that regular navigation is possible only on the lower stream courses.

The Rio São Francisco, together with its tributary stream, the Rio das Velhas, reaches more than 1,500 miles from southern Minas Gerais to the Atlantic coast of Alagoas. Much of its lower course is unnavigable because of waterfalls, rapids, shoals, and strong currents. Oceangoing ships with drafts of less than 6 feet can reach Penedo about 25 miles from the mouth, and smaller vessels reach Piranhas (Marechal Floriano) about 100 miles farther upstream. Continuing upstream, extensive rapids and falls make the river mostly unnavigable for about 300 miles to the rail terminal and port of Juazeiro (see Figure 141). Above Juazeiro the current slackens greatly and conditions for navigation improve. Steamboats and diesel-powered barges operate between Juazeiro and Pirapora almost 800 miles farther upstream. Shallow-draft steamers also operate on the Rio Grande, the Rio Corrente, the Rio das Velhas, and the Rio Paracatu -- tributaries of the São Francisco.

Most of the waterways along the Atlantic coast of Brazil between the Rio São Francisco and the Southern Region are short, swift-flowing streams that are navigable for only a few miles in their lower courses. The Rio Paraguaçu, emptying into the Baía de Todos os Santos, is an important outlet for agricultural products and manganese ore. Oceangoing vessels can reach Cachoeira, 22 miles from the mouth of the river, but navigation farther upstream is obstructed by rapids. Continuing down the coast, other rivers that are navigable for 75 to 180 miles by small shallow-draft steamers or launches include the Rio Pardo, Rio Jequitinhonha, Rio Doce, and Rio Paraíba.

3. Rivers and Lakes of the South and Southwest

The coastal waterways of southern Brazil bear more traffic than do those of any other part of the country. Over 1,000 miles of navigable streams, lakes, and lagoons provide convenient transportation routes for a rich agricultural hinterland.

The Rio Itajaí, although isolated from the more extensive waterways to the south, is a significant route for productive districts in Santa Catarina. River steamers operate between the lumber port of Itajaí near the mouth of the river and Blumenau, an important agricultural, manufacturing, and distribution center nearly 40 miles upstream. Rainfall is generally heavy the year round in this area, so navigation is not interrupted by seasonal fluctuations in the level of the river.

Lagoa dos Patos and Lagoa Mirim, together with their tributaries and connecting streams, form the major part of the important southern waterway system. Lagoa dos Patos is an enormous fresh-water lagoon stretching along the coastal lowland of Rio Grande do Sul. Dredged channels permit oceangoing ships to reach the main ports located around the margins of the lagoon, and a broad estuarylike river, the Rio Guaíba, which opens onto the northern part of the lagoon, provides access to numerous navigable tributary streams branching off into the interior.

The longest and most important tributary of the Rio Guaíba is the Rio Jacuí. The Jacuí is navigable for some 240 miles above its mouth, and it carries three-fourths of all cargo from the interior destined for transshipment to oceangoing ships in Porto Alegre at the northern end of Lagoa dos Patos. Bituminous coal from mines south of the river in the vicinity of São Jerônimo is transported down the Jacuí on barges to Porto Alegre, as are considerable amounts of rice and wheat. Four left-bank tributaries of the Jacuí are navigable to small boats and barges -- the Rio Taquari for about 80 miles and the Rio Cai, Rio dos Sinos, and Rio Gravataí for a total of about 140 miles -- all within the rich agricultural and industrial district north of Porto Alegre.

Lagoa dos Patos opens to the Atlantic through a narrow channel at its southwestern extremity. Oceangoing ships transfer their cargoes at the ports of Rio Grande and Pelotas to lighters and other shallow-draft vessels for shipment north to Porto Alegre.

South of Lagoa dos Patos, but connected to it by a canal, is another large fresh-water lagoon, Lagoa Mirim. The southern portion of this lagoon is shared by Brazil with neighboring Uruguay and serves as a means of communication between the two countries. Traffic on Lagoa Mirim is much lighter than on the more important lagoon to the north, but shallow-draft vessels provide regular service between its minor ports and Pelotas and Rio Grande.

An extensive and economically important waterway system discharges into the great estuary known as the Río de la Plata between Uruguay and Argentina. Three major rivers flowing out of southern Brazil contribute to this system: the Rio Uruguai, the Rio Paraná, and the Rio Paraguai.



Figure 132. Canoe on the Amazon near Ilha de Marajó.

Figure 133. Canoeists on the lower Amazon. Poles are used to propel the boats in shallow water.



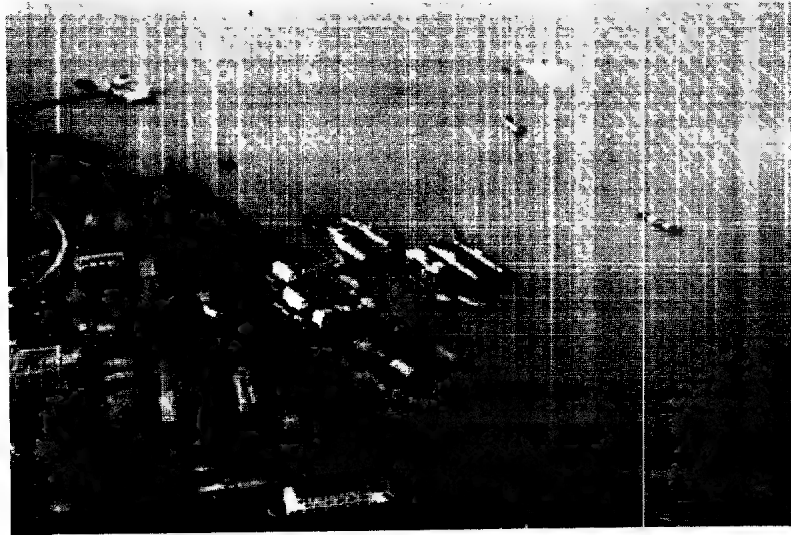


Figure 134. Rivercraft and oceangoing vessels at Belém.



Figure 135. Loading manganese ore at Porto Santana on the west branch of the lower Amazon. Note the railroad extending northward from the port area.

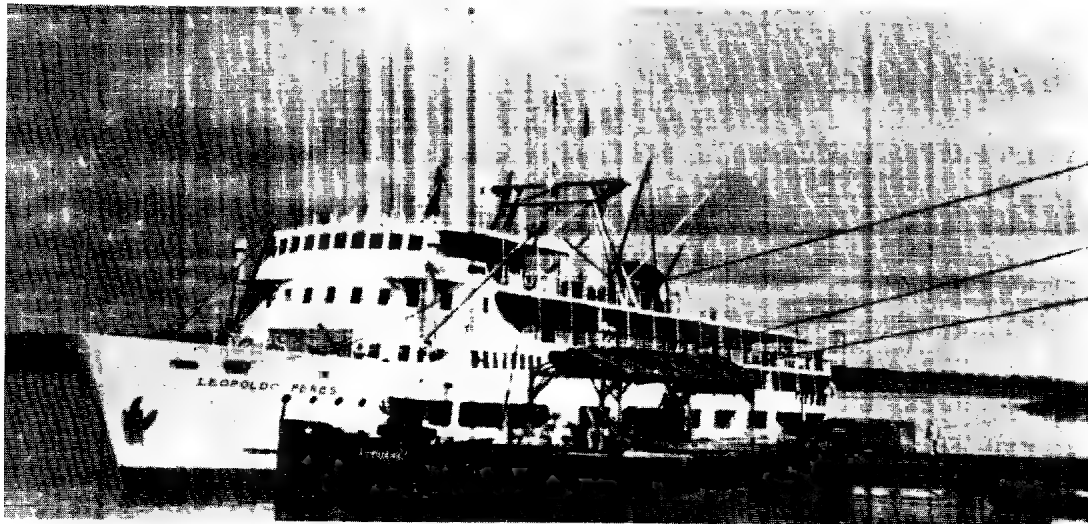


Figure 136. Ship at Pôrto Velho on the Rio Madeira.



Figure 137. Crude bark canoes of the Camiuras Indians of the upper Rio Xingu area in Mato Grosso.

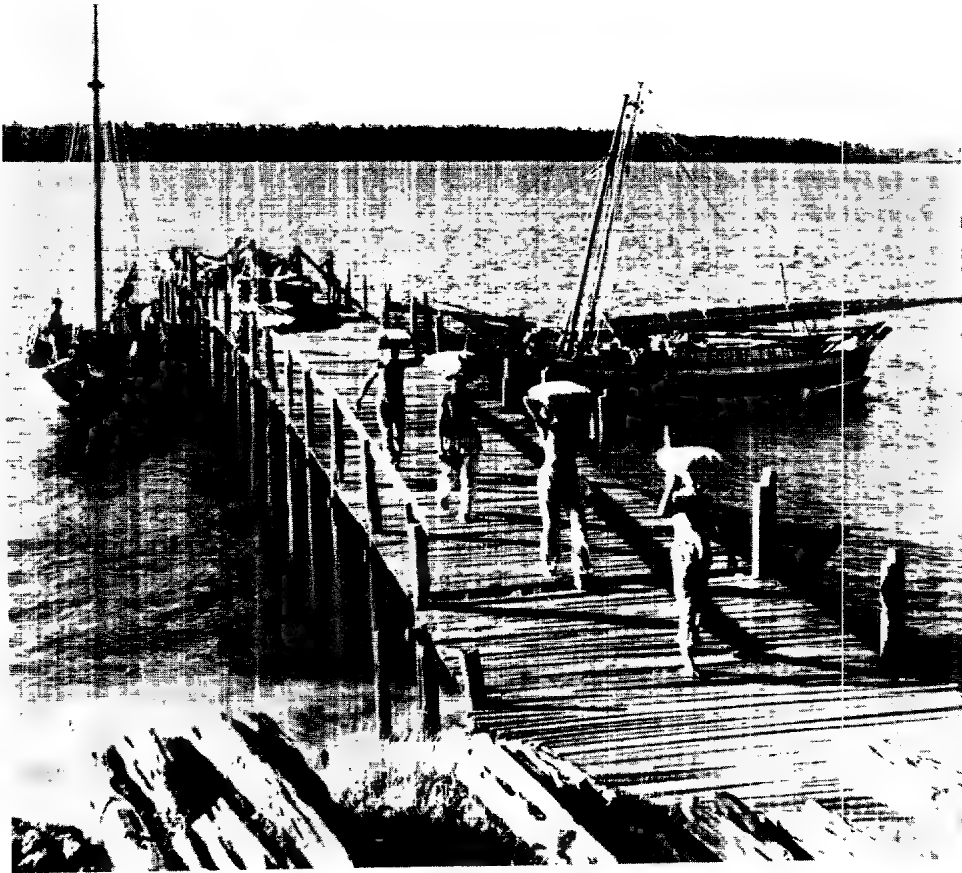


Figure 138. Pier at Cametá near the mouth of the Rio Tocantins.

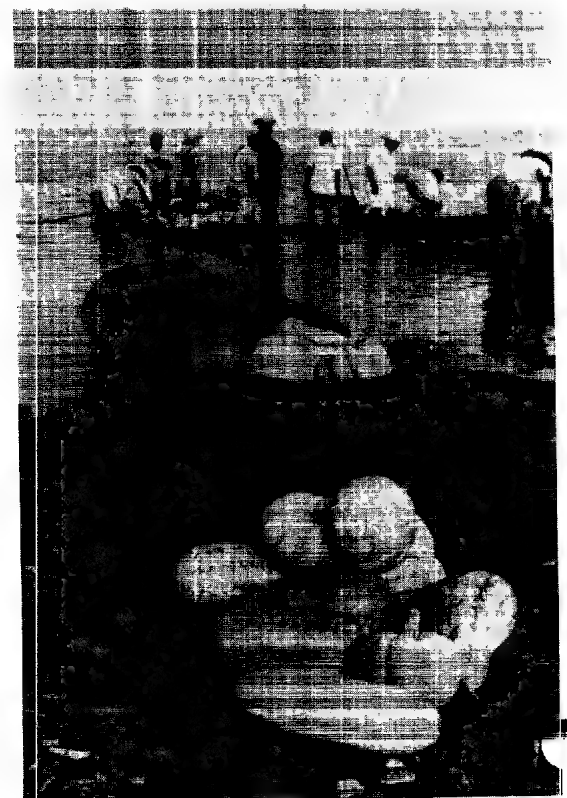


Figure 139. Native produce brought down the Rio Tocantins to market in Marabá.

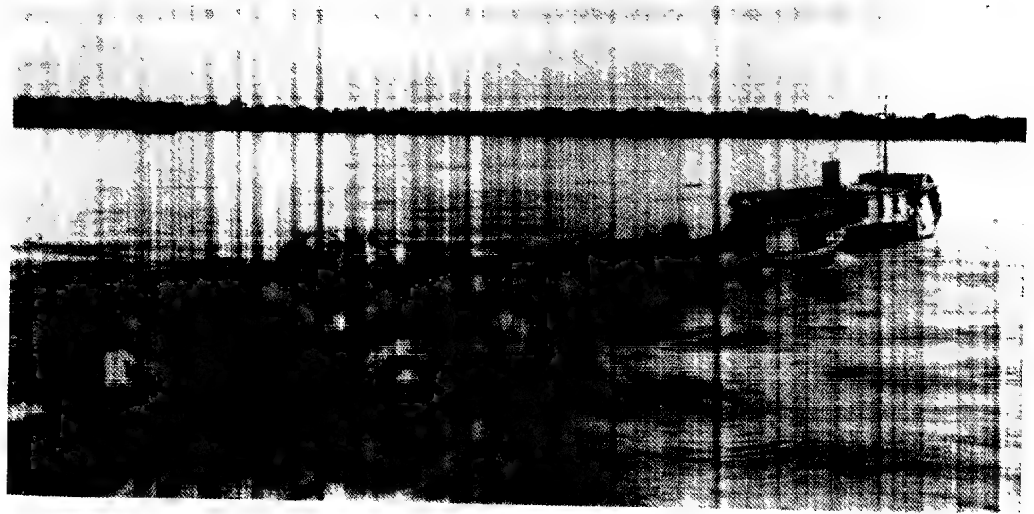


Figure 140. Small boats in tow on the Rio Negro near Manaus.

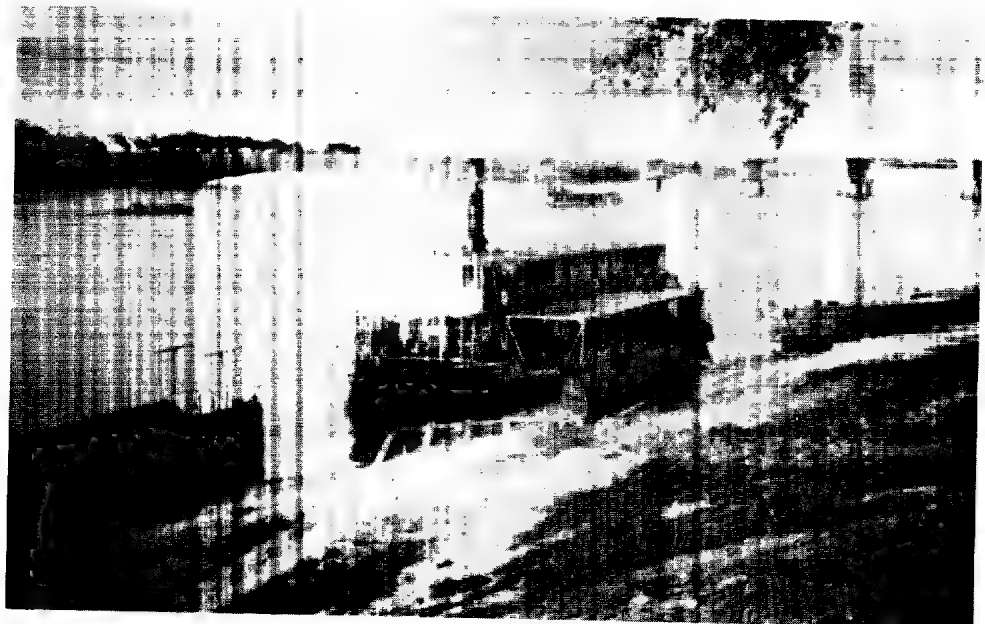


Figure 141. Ferry on the Rio São Francisco. The combination railroad and highway bridge in background connects Juazeiro and Petrolina.

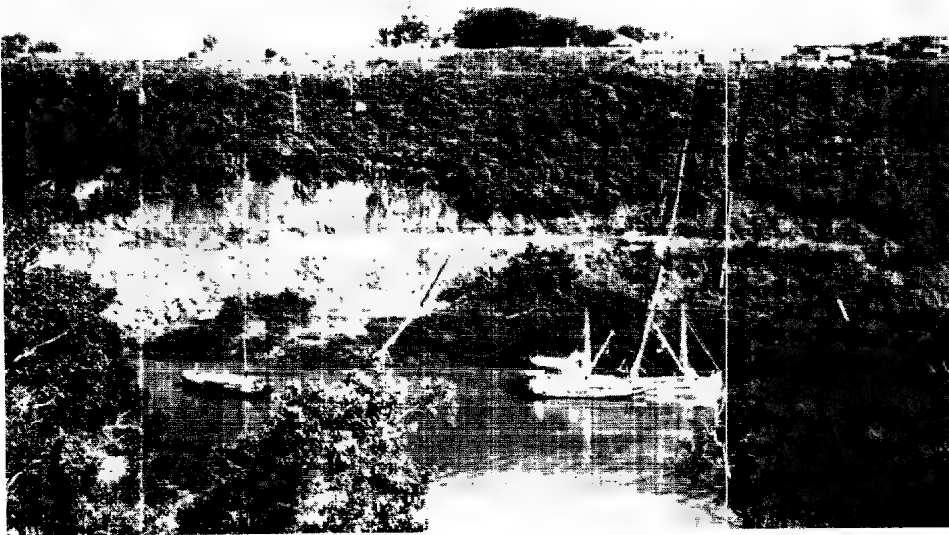


Figure 142. A left-bank tributary of the Rio Alto Paraná, the Rio Iguacu, at its low-water level during the dry season. (The Rio Alto Paraná exhibits similar extremes in water level.) Lumber is sent down chutes from the top of the steep bank to boats on the river below.

The Rio Uruguai, along the northern and western margin of Rio Grande do Sul, forms most of the boundary between Brazil and Argentina and, in its lower course, most of the boundary between Argentina and Uruguay. Throughout most of the year, the river is navigable by launch for over 1,000 miles above its mouth, about 700 miles of which are within or adjacent to Brazil. Thousands of small rivercraft transport agricultural products between Uruguaiana, São Borja, and other Brazilian railheads along the river, and timber is rafted from the headwaters downstream to the Río de la Plata. Tugs and supply launches serve the logging camps upstream.

The Rio Paraná, main stream of the La Plata system, is over 1,500 miles long. The upstream third of the river borders or lies within Brazil and forms most of what is known as the Alto Paraná. Two sections of the Alto Paraná are navigable within Brazil: an 80-mile stretch from the Argentine border to Porto Mendes and a stretch some 300 miles long from Guaira to unnavigable rapids above Três Lagoas. The impassable sector between these two stretches includes the Salto das Sete Quedas, a complex of rapids and gigantic waterfalls. The water level of the Alto Paraná may rise more than 100 feet from the dry season (June to October) to the flood seasons (February and May) (see Figure 142). The lower navigable section of the river below Porto Mendes is bounded by steep, forested banks and has numerous rapids and dangerous whirlpools. Forest products and yerba mate, usually destined for Buenos Aires, are the principal cargoes shipped on the Paraná.

The Rio Paraguai, largest and most important tributary of the Rio Paraná, flows out of the marshy Pantanal area of southwestern Mato Grosso. It traverses Paraguay and joins the Paraná at Corrientes, Argentina. The Brazilian portion of the Paraguai is navigable for over 600 miles except during the low-water season (November to February). Corumbá, about 150 miles upstream from the Paraguayan border, is the focus of most of the commercial activity in the area. Dried beef, forest products, and manganese ore mined from the great reserves just south of Corumbá are shipped downriver while petroleum products, staples, and general merchandise are shipped upriver.

E. Maritime Ports and Shipping

Waterborne shipping is vital to Brazil because of the marked concentration of population and industry along the coast. Foreign trade relies even more heavily than domestic trade on maritime shipping, since Brazil carries on comparatively

little foreign commerce by other means of transportation.

Some 200 or more ports, large and small, are situated along Brazil's 4,600 miles of seacoast (see Figures 143 through 146). Fewer than 20 of these, however, can be regarded as conventional deep-sea ports. The two largest, Rio de Janeiro and Santos, are within 200 nautical miles of each other on the southeast coast; together they handle roughly four-fifths (in value) of the merchandise passing through all of the deep-sea ports. Rio de Janeiro, the best equipped port, receives over half (in volume) of all imports. Santos, the major outlet for the highly industrialized São Paulo area, is notable as the greatest coffee port in the world (see Figure 143). To the south, Porto Alegre is important as an outlet for lumber and wheat, and Rio Grande is a major exporter of meat. Going up the coast from the Rio de Janeiro - Santos area, the capital of Espírito Santo, Vitória, is a shipping center for iron ore, as is Ponta do Tubarão, a recently opened deep-sea port a short distance northeast of Vitória. The first important port north of Rio de Janeiro is Salvador, which exports cacao, tobacco, manganese ore, and iron ore. Farther up the coast is Recife, chief port of the Northeast and an export point for sugar. Most of the other coastal ports have limited facilities and are of only local significance.

Almost all coastal shipping is carried on by Brazilian ships, although foreign vessels have recently been licensed to operate in Brazilian ports in order to expedite the transportation of refrigerated and industrial goods. Brazil's merchant marine consists of some 250 ships, about a fourth of which are tankers. A great many of the ships are old, slow, and in poor condition. The principal commodities shipped between Brazilian ports include salt, cotton, cloth, sugar, dried beef, rubber, beverages, and rice.

The estimated military port capacity, in terms of long tons of general cargo that can be discharged per day, for Rio de Janeiro is 51,000; Porto Alegre, 30,700; Santos, 28,000; Recife, 12,000; Rio Grande, 9,800; and Salvador, 6,600.

Cranes that are old and in a poor state of repair, shortages of covered storage space, and labor stoppages due to strikes all tend to prolong berthing time of vessels and to cause serious traffic congestion in many Brazilian ports. Another major problem at many ports is excessive silting and the consequent need for constant dredging. This applies to the harbors at Rio de Janeiro, Santos,



Figure 143. Trucks arriving with sacks of coffee for shipment from the busy port of Santos.



Figure 144. Ship taking on sacks of cocoa beans from a lighter in the open roadstead at Ilhéus, Bahia. A new port, which will have a protective breakwater and other facilities, is under construction nearby.

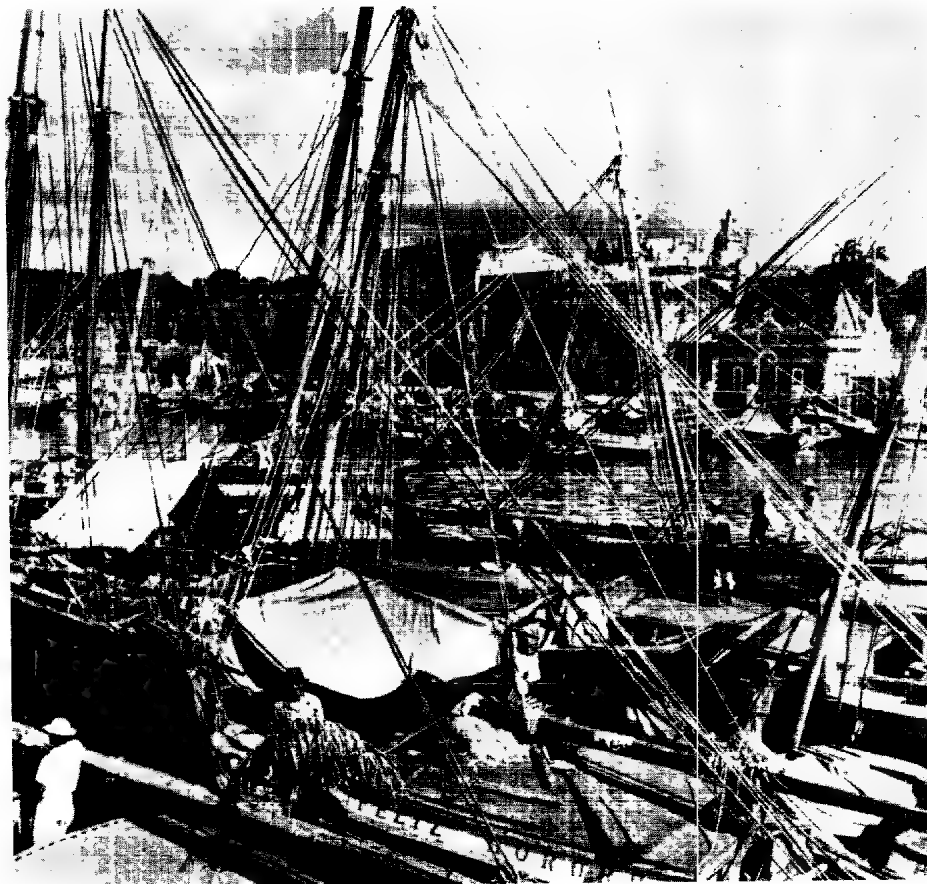


Figure 145. Sailboats in the crowded small-craft basin at Belém.

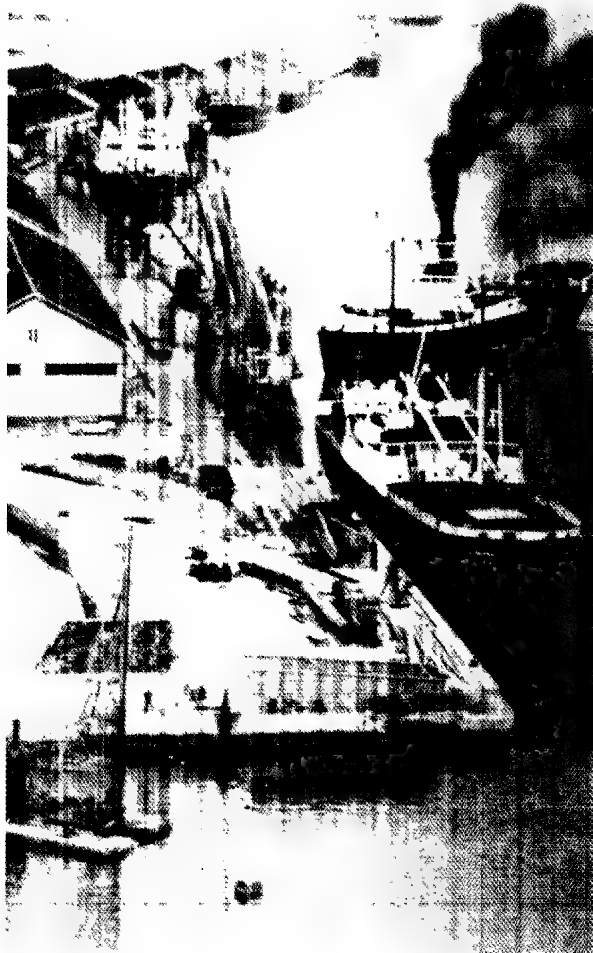


Figure 146. Warehouses, cranes, and cargo ships at Paranaguá, the main seaport of Paraná.

Recife, and Rio Grande.

The increasing inadequacy of coastal shipping and the weakness of the Brazilian transportation system in general are pointed up by the fact that in recent years the country has been forced to import salt, although plenty is available in Brazil. No port facilities exist in either Macau or Areia Branca, the two major salt-producing centers in Rio Grande do Norte, and the salt must be lightered to ships 12 or 15 miles offshore. Using these methods, it takes over 2 weeks to load a 10,000-ton ship, and the price of salt on arrival at Rio de Janeiro or Santos may be increased to as much as five times the price at the mines.

F. Air Transportation

Air transportation has assumed unusual importance in Brazil because of the size of the country and the inadequacies of other means of transportation. In the broad Amazon Basin, where the road and railroad networks are sparse and dependence on slow-moving rivercraft is heavy, places that formerly were isolated have been brought within easy reach of the great coastal population centers. Seaplanes and amphibians are used in many areas where airfield construction has been impractical.

Brazil appears to have an adequate number of airfields (see Maps 56752 and 56753, which are reprints of USAF Charts of Airfields and Seaplane Stations of the World, vol. 4-01A and vol. 4-01). Well over 1,000 are scattered throughout the country, with the greatest concentration in the coastal zone and in the south, particularly in São Paulo and southern Minas Gerais. Only about 90 airfields have paved runways, however, and many of the smaller runways are merely dirt or grass strips with little or no supporting facilities (see Figures 147 through 149).

The busiest and most important airports in Brazil are Aeroporto Santos Dumont in downtown Rio de Janeiro; Aeroporto Galeão, a short distance outside Rio de Janeiro; Aeroporto Congonhas near São Paulo; and Aeroporto Viracopas near Campinas (22°54'S 47°05'W). Eight additional airfields handle most of the remaining air traffic. These are located at or near Belém, Recife, Salvador, Belo Horizonte, Londrina, Porto Alegre, Goiânia, and Brasília.

Domestic air activities are carried on by some 17 scheduled airlines, including Varig, the biggest and best in South America, as well as by about 14 nonscheduled and

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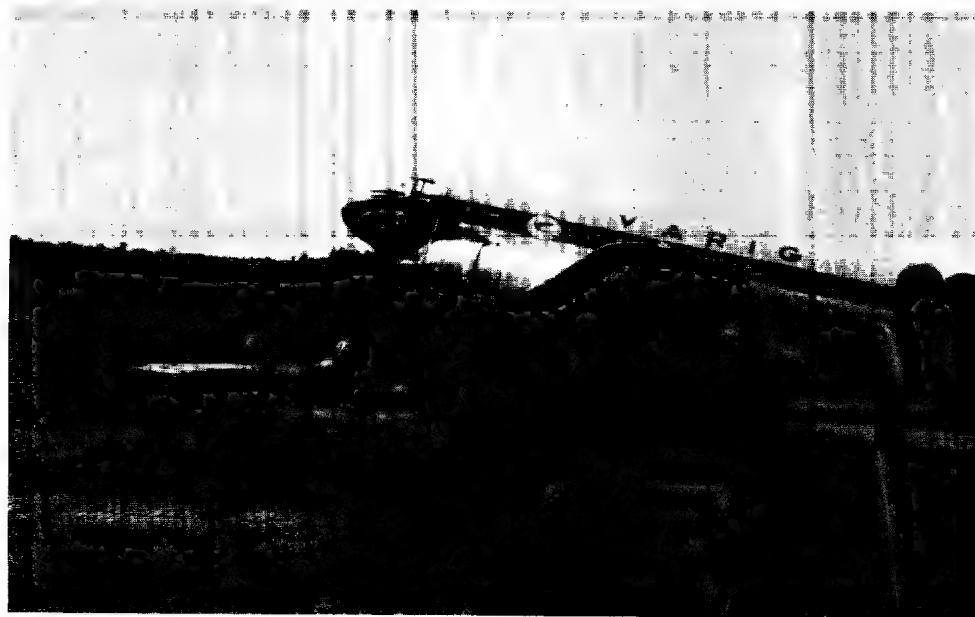


Figure 147. A Varig Airlines DC-3 at the small Brazilian airfield near Foz do Iguaçu in the Brazil - Paraguay - Argentina triborder area.



Figure 148. Private plane being refueled at an airstrip near Oiapoque on the French Guiana border in northern Amapá Territory.

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Figure 149. Oxcart transporting baggage to Varig airliner at a small airfield near Marabá on the Rio Tocantins in the state of Pará.

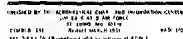
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charter airlines. In addition, the Brazilian Military Air Transport Command carries cargo, passengers, and mail. Scheduled international services are maintained with 25 countries. Commercial carriers own about 264 large aircraft, whereas some 2,300 other aircraft, mostly light, are owned by private individuals, aeroclubs, and other organizations.

Poor maintenance and the lack of adequate landing facilities and aids to navigation have resulted in a poor safety record for Brazilian airlines. Many of the earth or sod landing strips in all parts of the country become soggy and hazardous after heavy rains, and some airfields are occasionally closed to traffic because of morning fog. Great cumulus clouds often restrict visibility over the Amazon Basin and elsewhere and make contact navigation difficult. Flying conditions are generally good over most of southeastern Brazil, but the extreme southern portion of the country frequently experiences restricted visibility during the winter.

G. Cross-Border Movement

Brazil shares borders with every other country in South America except Chile and Ecuador. The boundaries have a combined length of over 9,700 miles and run mostly through sparsely inhabited, poorly developed zones remote from the centers of population (see Table 7). Roads and other transportation facilities in these isolated border zones are sparse and extremely difficult to patrol effectively. It is small wonder therefore that smuggling and other illicit traffic between Brazil and her neighbors are difficult to detect or prevent.

Belém is probably the biggest smuggling center in Brazil, but most operations there involve maritime transportation. Thousands of bags of coffee and cacao shipped up from the south are smuggled out of Belém on coastal schooners and small diesel-powered craft bound for the Guianas. From Cayenne (French Guiana) or Paramaribo (Surinam), the main transit points, cargoes are picked up by tramp steamers for delivery to ports in North America. Similarly, US cigarettes, whisky, radios, television sets, and even automobiles are smuggled into Belém.

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Table 7

International Boundaries of Brazil and Factors Related to Cross-Border Movement

Boundary		Cross-Border Movement	
Country	Length (Miles)	Major Elements of Alignment	Terrain and Vegetation
Uruguay	623	Streams, lake, drainage divide	Plains, low hills, grasslands
Argentina	785	Rio Paraná, Rio Uruguai, hills	Forested lowlands
Paraguay	832	Rio Paraguai, Rio Paraná, hills	Forested lowlands, hills
Bolivia	1,942	Rio Guaporé, hills	Forested lowlands, hills, marsh
Peru	1,861	Rio Javari, hills	Forested lowlands, hills
Colombia	1,022	Streams, straight lines	Forested lowlands
Venezuela	929	Hills, drainage divide	Forested lowlands, hills, low mountains, grassland
Guyana (formerly British Guiana)	998	Stream, hills	Forested lowlands, rugged hills, savanna
Surinam	369	Drainage divide	Forested lowlands, rugged hills
French Guiana	407	Rio Oiapoque	Forested lowlands, rugged hills
Total	9,768		

*In addition to the avenues of movement listed, all of the border areas have streams or other waterways.

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1. Movement Across Guianan, Venezuelan, Colombian, Peruvian, and Bolivian Borders

Smuggling on a smaller scale is carried out overland with the Guianas. Diamonds are brought from Guyana (formerly British Guiana) to buyers in Boa Vista in northern Roraima, and small-scale prospectors known as garimpeiros probably make frequent illegal boundary crossings in search of minerals. Illegal transit of the border for those who can afford air passage has been facilitated by the establishment of small landing fields associated with trading posts in the frontier zones. All other movement, legal or illegal, between Brazil and the Guianas is by water or trail, as there are no roads or railroads.

Inland waterways and trails also provide the only means of transportation in the Brazilian border zones with Venezuela, Colombia, and Peru. The Rio Negro is the principal avenue for movement in the Brazil - Venezuela - Colombia trifrontier area, but traffic is very light. Farther south, where Brazil, Colombia, and Peru come together, the Amazon forms the main transportation artery and cross-border traffic is heavy. Much of the local trade focuses on the free port of Leticia, Colombia's only outlet on the Amazon. Nearby is the small Brazilian frontier post of Tabatinga.

Oceangoing ships continue up the Amazon to Iquitos, Peru, some 300 miles from the border, or call at Benjamin Constant on the Rio Javari a short distance upstream from its juncture with the Amazon. The Javari forms over 500 miles of the boundary between Brazil and Peru and is a major route for contraband traffic between the two countries. The Rio Juruá and the Rio Purus with its tributary, the Rio Acre, provide additional navigable routes between Brazil and Peru.

The Acre also serves as a route between Brazil and northern Bolivia's forest-covered Pando Department. Cobija, capital of the Pando, is located on the right bank of the Acre directly across from the Brazilian town of Brasiléia. Small launches ferry passengers back and forth across the river. No immigration or customs checks were reported on either side as late as May 1963, and people and goods move freely in both directions. At times during the dry season (May through August), the Acre is fordable between Cobija and Brasiléia.

Brazil's only surface connection with northern Bolivia, other than the Rio Acre, consists of navigable tributaries of the Rio Madeira system. Chief of these is the Rio Mamoré. The Mamoré, forming some 160 miles of the boundary between Bolivia and Brazil, is noted as an avenue for contraband.

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Thousands of head of cattle as well as dried meat are brought into Brazil from Bolivia via the Mamoré every year. Guajará-Mirim, on the right bank of the river, is the principal Brazilian port, whereas Puerto Sucre (also known as Guayamerin) on the left bank, is the principal Bolivian port in the area.

Guajará-Mirim is linked by road and railroad to Porto Velho on the Rio Madeira. Puerto Sucre is connected by trail with Riberalta near the confluence of two navigable rivers, the Río Beni and its tributary the Río Madre de Dios. The Beni is navigable to shallow-draft boats for nearly 600 miles southwestward in the direction of La Paz while the Madre de Dios is navigable to small stream launches throughout its course in Bolivia and for 50 miles in Peru to Puerto Maldonado. Cuban-trained subversives, after transiting Brazil and Bolivia, have used the Madre de Dios to enter Peru.

The Rio Guaporé, a major tributary of the Mamoré, forms approximately 500 miles of the boundary between Bolivia and Brazil. Traffic on the river is extremely light, but regular service is maintained from Guajará-Mirim on the Mamoré all the way upstream to the town of Mato Grosso at the head of navigation on the Guaporé. There are few settlements in the area other than small Indian villages and scattered outposts for gathering rubber. From Mato Grosso numerous trails extend into Bolivia and a road (BR-416) runs southeastward to Cáceres on the Rio Paraguai.

During 1964 guerrillas operating in Bolivia's Beni and Santa Cruz Departments were reported to have crossed the Rio Guaporé into Brazil often. Crossings are said to have been made in the vicinity of Principe da Beira and at several other points along the river. Supplies for the Bolivian guerrillas reportedly were flown in from Brazil by Catalina-type flying boats, which used some of the many small lakes in the frontier zone south of the Rio Guaporé.

The only rail link between Bolivia and Brazil is the meter-gauge Santa Cruz - Corumbá line, which enters the State of Mato Grosso from eastern Bolivia. It has been said that the Bolivian border town on the line, Puerto Suárez, practically exists on smuggling. Goods brought to Puerto Suárez by rail, reportedly are smuggled across the border at night to Corumbá, Brazil, where they demand good prices. In addition to the usual cigarettes, whisky, and perfume, machineguns and ammunition concealed in sacks of salt were recently discovered being shipped into Corumbá from Bolivia.

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Regular ferry service is maintained between Puerto Suárez and Corumbá. Ladário, near Corumbá, serves as headquarters of the Mato Grosso Naval Command on the border, and its facilities provide maintenance for the gunboats that patrol the river. A number of small lakes along the border give Bolivia access to the Rio Paraguai. For a short distance the Rio Paraguai forms the southernmost part of the boundary between Bolivia and Brazil.

2. Movement Across Paraguayan Border

The Rio Paraguai forms nearly 200 miles of the Brazil - Paraguay boundary. Transportation facilities along both the Brazilian and Paraguayan sides of the river are very limited. Several narrow-gauge lumbering railroads extend back into the Paraguayan Chaco from minor ports on the river. Most of the other settlements on the river have few or no landing facilities. At Bahia Negra and Olimpio, for example, boats simply tie up to the river bluff. Going downstream on the Brazilian side the first town of any importance is Porto Murtinho, which has a road connection (BR-267) running eastward to join the main highway network of Mato Grosso. Isla Margarita, a small Paraguayan island in the river near Porto Murtinho, has allegedly been the site of considerable contraband activity. River vessels tie up directly to the beach.

About 25 miles south of Porto Murtinho the boundary is formed by the Rio Apa, a left-bank tributary of the Rio Paraguai. Bela Vista, on the Brazilian side, is the only sizable town on this river. It has an airstrip and a road (BR-74) that runs northward to Jardim to connect with the rest of the road system of Mato Grosso. On the Paraguayan side, opposite Bela Vista, is Bella Vista, which also has a small airstrip and a poor dirt road that leads southward to Concepción. Recent plans call for a bridge over the Rio Apa to connect the two towns.

Southeast of Bella Vista, beyond the headwaters of the Apa, the Brazil - Paraguay boundary follows a drainage divide as far as the Rio Paraná. At a number of places in this segment, settlements actually straddle the boundary. For example, Ponta Porã (Brazil) and Pedro Juan Caballero (Paraguay) are practically a single town, with the boundary extending down the main street. The movement of people or goods from one town to the other is not controlled, and the place has long been the center of a flourishing contraband trade. Coffee, cotton, electrical appliances, and other items have entered Paraguay through this border town, whereas whisky, drugs, cloth, and firearms reportedly have moved in the other direction.

Since the Brazilian revolution of 1 April 1964, however, military checkpoints have been established along the roads out of Ponta Porã, and these may have reduced the flow of contraband. Jeepable roads parallel the border on the Brazilian side north and south of Ponta Porã, and a federal highway (BR-86) runs northeastward to Dourados. A branch line of the Northwestern of Brazil Railway extends from Ponta Porã to Campo Grande, where it joins the trunk route from Bauru to Corumbá. An airfield with gravel-surfaced runways is located a short distance south-east of Ponta Porã.

Transportation facilities on the Paraguayan side of the border are more limited. Roads are usable in good weather for trucking out coffee, but there are no railroads, and the all-weather road to Concepción is still under construction. A small airfield southeast of Concepción is used for semiweekly flights of DC-3 aircraft of the Paraguayan Military Air Transport service. Reportedly, many of the contraband goods that arrive in Pedro Juan Caballero continue their journeys to other destinations by air.

The relationship between the border villages of Antônio João (Brazil) and Capitán Bado (Paraguay) is similar to that between Ponta Porã and Pedro Juan Caballero, though the villages are smaller. The boundary runs down the main street, and commerce between the two sections is probably completely free. Roads on the Paraguayan side are little better than trails. On the Brazilian side a dirt road extends to Amabaí and connects with the highway leading to Ponta Porã. A small airfield is located about a mile north of Antônio João. During the wet season (November to May) small, shallow-draft boats can navigate the nearby Rio Iguatemi for about 130 miles downstream to its confluence with the Rio Paraná.

The Rio Paraná forms the boundary between Brazil and Paraguay for about 130 miles -- from just above the great waterfalls known as the Sete Quedas downstream to the mouth of the Rio Iguaçu. Several minor ports -- Guaíra, Pôrto Mendes, Pôrto Britânia, Pôrto Santa Helena, and Foz do Iguaçu -- are located on the Brazilian side of the river but, except for a few primitive landings, most of the area along the Paraguayan side includes nothing but dense forests. The Brazilian river ports are connected by secondary roads to the main road network of Paraná, and a short railroad runs from Pôrto Mendes to Guaíra as a bypass to the Sete Quedas. The few small settlements on the Paraguayan side of the river are connected by foot trails and logging roads.

A recently opened international bridge spanning the Rio Paraná just north of Foz do Iguazu provides an important highway link in the Pan American Highway system between Brazil and Paraguay (see Figure 150). Completion of the bridge opens a route all the way from Asunción, Paraguay, to the port of Paranaguá on the Atlantic coast. The Paraguayan Military Air Transport service makes regular flights to a small airfield at Puerto Presidente Stroessner, a new village at the Paraguayan end of the international bridge. On the Brazilian side of the river a small airstrip near Foz do Iguazu is used regularly on flights between Brazil and Paraguay. Many tourists land at this airfield and visit the famous Iguazu waterfalls a short distance upstream on the Rio Iguazu, especially in the period from May to November. A gravel road (BR-277) runs northeastward from Foz do Iguazu to Cascavel.

3. Movement Across Argentine Border

The Rio Iguazu forms part of the boundary between Brazil and the northeastern tip of Argentina. Large national parks of Brazil and Argentina occupy the densely forested country immediately north and south of the river. Puerto Iguazú, near the confluence of the Rio Paraná and the Rio Iguazu, is the only sizable town on the Argentine side. An outboard motorboat ferries passengers across the river from Puerto Iguazú to the village of Porto Meira on the Brazilian side. From Porto Meira a road leads to Foz do Iguazu, a few miles away. Argentine Route 101 extends from Puerto Iguazú to Cataratas del Iguazú near the waterfalls, which has an airfield and a hotel. Small boats can cross the river a short distance above the falls. From Cataratas del Iguazú, Route 101 continues to Bernardo de Irigoyen, about 60 miles to the southeast on the Brazilian frontier. Another gravel road, Argentine Route 12, extends from Cataratas del Iguazú southwestward along the Rio Paraná to Posadas.

Rio Santo Antônio, a tributary of the Iguazu, forms about 40 miles of the border between Paraná and Argentina's Misiones Province. On the Brazilian side, a gravel road runs southward to Santo Antônio and on to Barracão, a border town at the headwaters of the Rio Peperi Guaçu. From Barracão, dirt and gravel roads radiate into Argentina (northeastward to Puerto Iguazú and southeastward to Posadas) as well as eastward through Paraná and southward into Santa Catarina.

The Rio Peperi Guaçu, flowing southward from Barracão, constitutes most of the boundary between Argentina and Brazil in the Santa Catarina State segment; it is navigable by shallow-draft boats for a short distance above its juncture with the

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Figure 150. Recently completed international bridge over the Rio Paraná between Brazil and Paraguay near Foz do Iguazu. With a central concrete span 951 feet long, this bridge is one of the longest of its kind in South America.

Rio Uruguai not far from Itapiranga. The Rio Uruguai forms all of the remaining 445 miles of the Brazil - Argentina boundary. Moving downstream along the river, settlements become larger and their supporting transportation facilities correspondingly better developed. São Borja and Itaquí on the Brazilian side and Santo Tomé and La Cruz in Argentina have airports and road and rail connections, as well as minor river port facilities. São Borja is the export point for Brazilian timber and grain destined for shipment across the river to Santo Tomé; it also handles the importation of a considerable amount of Argentine salt. Contraband trade reportedly has thrived in the vicinity of São Borja.

Farther downstream, at Uruguaiana, is the only bridge across the Rio Uruguai between Brazil and Argentina. It is a combination railroad and highway bridge that extends from Uruguaiana to Paso de los Libres on the Argentine side. A dual-gauge track across the bridge provides an interconnection between the standard-gauge line on the Argentine side, which runs from Buenos Aires to Posadas, and the meter-gauge line of the Rio Grande do Sul Railway on the Brazilian side, which extends eastward to Santa Maria. Roads parallel the river north and south of Uruguaiana, and an all-weather gravel road (BR-290) extends eastward to Alegrete.

4. Movement Across Uruguayan Border

The Brazilian border with Uruguay is approximately 525 miles long. Slightly over two-thirds is defined by rivers, streams, and other water bodies, and the remainder -- the central segment -- is defined by drainage divides and other terrain features.

The Rio Quarai (known as the Río Cuareim in Uruguay) forms most of the western third of the boundary. It is navigable by small craft for only a short distance above its confluence with the Rio Uruguai, and its upper reaches are fordable in numerous places except during high-water stages. Both railroad and highway bridges cross the Rio Quarai between Barra do Quarai and Bella Unión. The meter-gauge Rio Grande do Sul Railway extends southward from Uruguaiana and makes an international connection at Barra do Quarai where a dual-gauge line crosses the Rio Quarai to Bella Unión, Uruguay. A standard-gauge Uruguayan line continues southward to Montevideo. There are also rail and road connections farther upstream between the towns of Quarai (Brazil) and Artigas (Uruguay). A gravel road and several dirt roads extend into Brazil from Quarai, and a paved highway (Uruguay Route 30) connects Artigas with other points in Uruguay. Small airfields are located about

a mile northeast of Quaraí and a short distance southwest of Artigas.

Continuing to the southeast along the border, the Brazilian town of Santana do Livramento is separated by a street from the Uruguayan town of Rivera. Two lines of the Rio Grande do Sul Railway system focus on Santana do Livramento -- one running southwestward from Rosário do Sul and the other westward from the deep-water port of Rio Grande. A dual-gauge track connects these meter-gauge lines with a standard-gauge line extending from Rivera to Montevideo via Tacuarembó. An airfield is located about 6 miles northwest of Santana do Livramento, and three other small ones are situated within 5 miles of Rivera. Two gravel roads and numerous dirt roads radiate from Santana do Livramento, and a paved highway (Uruguay Route 5) extends southward from Rivera to Tacuarembó.

Dirt roads cross the border at several places southeast of Santana do Livramento, but the only significant border-crossing point northwest of Jaguarão is at Aceguá where a gravel road runs northward to Bagé and southward to Melo, Uruguay. Beginning at a point not far from Aceguá and extending southeastward to Lagoa Mirim the boundary is formed by the Rio Jaguarão. This stream, like the Rio Quaraí, is navigable for a relatively short distance above its mouth, and its upper reaches are usually fordable in numerous places.

The Brazilian town of Jaguarão is situated about 14 miles upstream from the mouth of the Rio Jaguarão. It is connected by a combination rail and highway bridge with Río Branco on the Uruguayan side. With a total length of 6,900 feet, the bridge is one of the longest in South America. A meter-gauge branch line of the Rio Grande do Sul Railway extends northward and connects with the trunk line to Rio Grande; a standard-gauge line extends from Río Branco to Montevideo. Port facilities at Jaguarão and Río Branco are used by small coastal vessels and river steamers. A small airfield is located about 4 miles north-northwest of Jaguarão, and another airfield or landing site is probably located near Río Branco on the Uruguayan side. In addition to several dirt roads that radiate from the two towns, gravel roads extend northeastward to Pelotas and westward to Melo, Uruguay.

From the mouth of the Rio Jaguarão southward the boundary between Brazil and Uruguay runs down the center of Lagoa Mirim and, for a short distance, along a small stream at the southern end of the lake. Lagoa Mirim is used mostly by shallow-draft Brazilian trading vessels and Uruguayan fishing boats. Reportedly, the lake and surrounding area have been the scene of considerable contraband traffic.

The bordering towns of Chui (Brazil) and Chuy (Uruguay) are situated midway along the short segment of frontier stretching from the extreme southern tip of Lagoa Mirim to the Atlantic Ocean. A street marks the boundary between the two towns. A gravel road (BR-471) runs northward out of Chui and along the dune-bordered tract separating Lagoa Mirim from the sea. Uruguayan Route 9 extends southward along the coast.

The nearest known airfield to this segment of the border on the Brazilian side is a grass field about 2-1/2 miles northeast of Santa Vitória do Palmar, which is approximately 10 miles northeast of Chui. It is used in civil light transport operations and is the southernmost airfield in Brazil. A privately owned pasture on the Uruguayan side of the border, near Chuy, has also been used as a landing field by light aircraft. After shopping in Chui, Brazil, Uruguayans return across the border and depart from this field to avoid the customs checkpoints on the access roads to Chuy.

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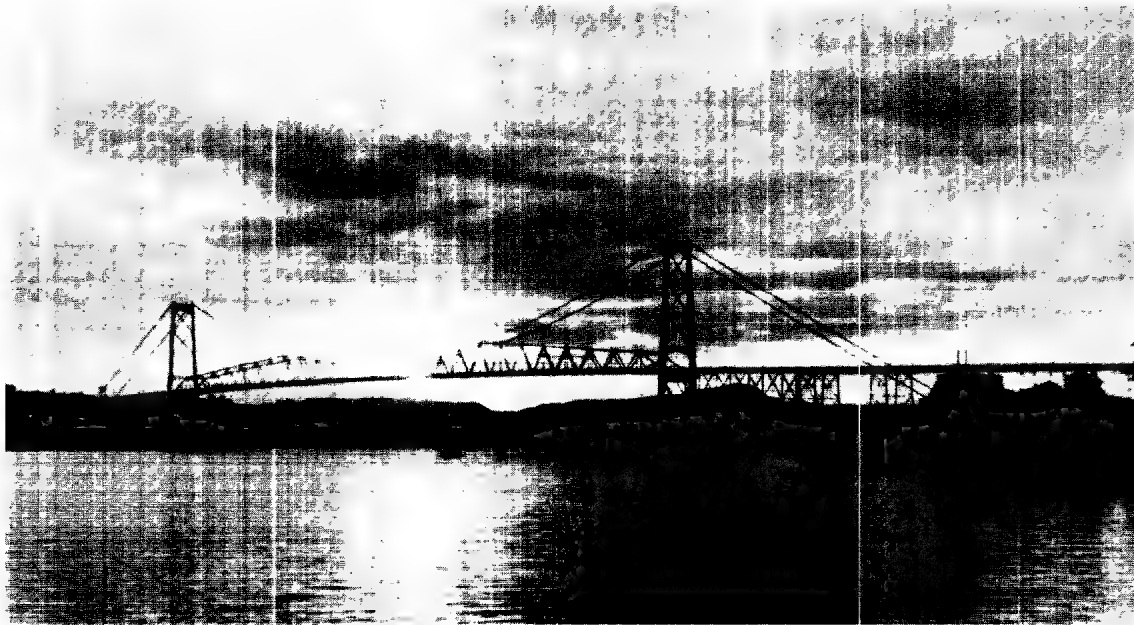


Figure 151. Hercilio Luz bridge connecting Florianópolis on Ilha de Santa Catarina with the mainland of Santa Catarina State.



Figure 152. Railroad bridge over the Rio Itajaí near Blumenau on the trunkline of the Santa Catarina Railway.

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VIII. Telecommunications

A. General

Brazil's common carrier telecommunications system is seriously inadequate in relation to national needs. For domestic telephone and telegraph service, most users must depend mainly on open wirelines and high-frequency (HF) radio facilities, which are relatively low in both capacity and reliability. Modern high-capacity transmission media, such as microwave radio relay and coaxial cable, are available only between several of the larger cities in southeastern Brazil. In addition to common carrier facilities, the armed forces, police, and railroads operate special-purpose telecommunications networks; for the most part, these specialized networks are not accessible to the general public.

International communications and broadcasting services are relatively better developed than domestic common carrier telecommunications. Brazil is connected by open wireline to neighboring countries in the south and by HF radio and submarine telegraph cable to more distant points. Brazil's broadcasting facilities number more than 800 radio stations and about 60 television stations. The Brazilian reception base consists of about 10 million radio sets and approximately 2.5 million television sets.

B. Organization of Telecommunications Services

Over 500 companies, both governmental and private, operate Brazil's telecommunications system, under the supervision of the National Telecommunications Council (Conselho Nacional de Telecomunicações, or CONTEL), created in 1962. The principal telecommunications enterprise owned by the government is the Department of Posts and Telegraphs (Departamento dos Correios e Telégrafos, or DCT), which operates an extensive telegraphic open wireline system and some HF radio stations. The major private firm is the Brazilian Telephone Company (Companhia Telefônica Brasileira, or CTB), which operates about 75 percent of the country's telephone service. The CTB has been under government intervention since 1962. Other important private firms are the International Radio Company of Brazil (Radio Internacional do Brasil, or RADIONAL) and the Radiotelegraph Company of Brazil (Companhia Radiotelegrafica Brasileira, or RADIOBRAS) which provide domestic and international high-frequency radio services. Also noteworthy are Italcable Cable, Telegraph, and Radio Services (Italcable Servizi Cablografici, Radiotelegrafici, e Radioelettrici S.A.) and the Western Telegraph Company, operators of coastwise and international submarine cables.

C. Telephone and Telegraph Facilities

1. Domestic

Brazil's domestic telephone and telegraph transmission media consist of a mixture of open wirelines, HF radio, microwave radio relay, coaxial cable, and submarine cable (see Maps 56150 and 56151). The open wireline system, although quite widespread, is of generally poor quality and inadequate to fulfill the telephone and telegraph transmission needs of the country. Most of the open wirelines are owned by the DCT and are used for telegraph transmission. The DCT, however, does lease some of its lines to private firms, and in the southeast private firms own and operate open wirelines providing telephone services. The public open wireline system is supplemented by the open wireline system of the railroads. This network is integrated into the public network and, thus, extends telecommunications services into areas of the country not reached by the DCT system itself.

In addition to open wirelines, a network of HF radio facilities also handles telephone and telegraph traffic. These facilities are operated primarily by RADIONAL and the DCT. The HF radio network provides telephone and telegraph connections among the more widely separated major cities and constitutes the primary means of communications for many of the towns of the interior.

Brazil's most modern and efficient telecommunications media are located in the geographic triangle described by Rio de Janeiro, Sao Paulo, and Brasilia. They consist of microwave radio relay routes and coaxial cable lines with capacities ranging from 120 to 420 voice channels. As shown in Map 56151, microwave radio relay routes radiate from Rio de Janeiro to Sao Paulo, Campinas, and also to Brasilia via Belo Horizonte. Coaxial cables of high capacity augment the microwave radio relay system by providing connections between Rio de Janeiro and Petropolis and also between Sao Paulo and Santos.

Submarine cables capable of single-channel telegraph transmission connect the coastal cities of Rio Grande, Florianópolis, Santos, Rio de Janeiro, Vitória, Salvador, Maceió, Recife, Natal, Fortaleza, São Luis, and Belém.

By 1966 Brazil had approximately 1.3 million telephones for a population of about 84 million. This ratio is not only far below those of North America and Western Europe, but is

also substantially lower than comparable ratios for Argentina, Chile, Colombia, Uruguay, and Venezuela. Most of Brazil's telephones are located in the southeast, the most industrialized part of the country. More than 50 percent of them are concentrated in just two cities: Rio de Janeiro with about 375,000 and São Paulo with about 300,000. Telephone exchanges in Brazil are generally automatic in the major cities, except for Rio de Janeiro, where 68 out of 95 exchanges are manual.

2. International

Brazil uses a variety of media for international telecommunications, including open wirelines, HF radio, and submarine telegraph cables. International telephone and telegraph connections via open wireline run from southern Brazil into the adjoining countries of Argentina, Paraguay, and Uruguay. Submarine cables provide international telegraph links to North and South America, Europe, and Africa from terminals located in Rio de Janeiro, Rio Grande, Santos, Recife, and São Luis. Brazil's chief means of international telephone and telegraph communication, however, is HF radio. Both RADIONAL and RADIOBRAS have HF facilities which provide connections with major cities in North and South America, Europe, Africa, and Asia. RADIONAL's transmitter site is located at Marapicu (near Rio) and the RADIOBRAS transmitting facility is located at Sepetiba (also near Rio). The international receiver sites of both companies are located at Jacarepaguá, a Rio suburb. The DCT also operates HF radio-telegraph links from other cities in Brazil to adjoining countries of South America. All of these international facilities are tied into the domestic telecommunications system, enabling them to handle traffic to and from the cities of the interior.

D. Broadcasting

1. Radio

Radiobroadcasting is the most extensively developed telecommunications service in Brazil. Brazil has more than 800 AM broadcasting stations and about 115 FM stations, most of which are privately owned. The vast majority of these are low-power facilities designed for local listening. Brazil has no well-developed broadcasting network system, although the government does operate "Radio Nacional" stations in Brasília, Rio de Janeiro, and São Paulo which broadcast the official viewpoints of the Brazilian government.

Also, the government requires the private radio stations to broadcast regularly the government program "Agência Nacional." In addition, the Catholic Church owns or controls a group of approximately 90 radio stations, located for the most part in the smaller towns of the interior. There are about 10,000,000 radio receivers in Brazil.

2. Television

Brazil has about 60 television stations, most of which are concentrated in the populous southeast area of the country. As with the radiobroadcasting stations, most of the television stations are privately owned and operated. The government does, however, operate "Radio Nacional" television stations in Brasília and Rio de Janeiro. There are approximately 2.5 million television receivers in Brazil.

E. Special-Purpose Telecommunications Systems

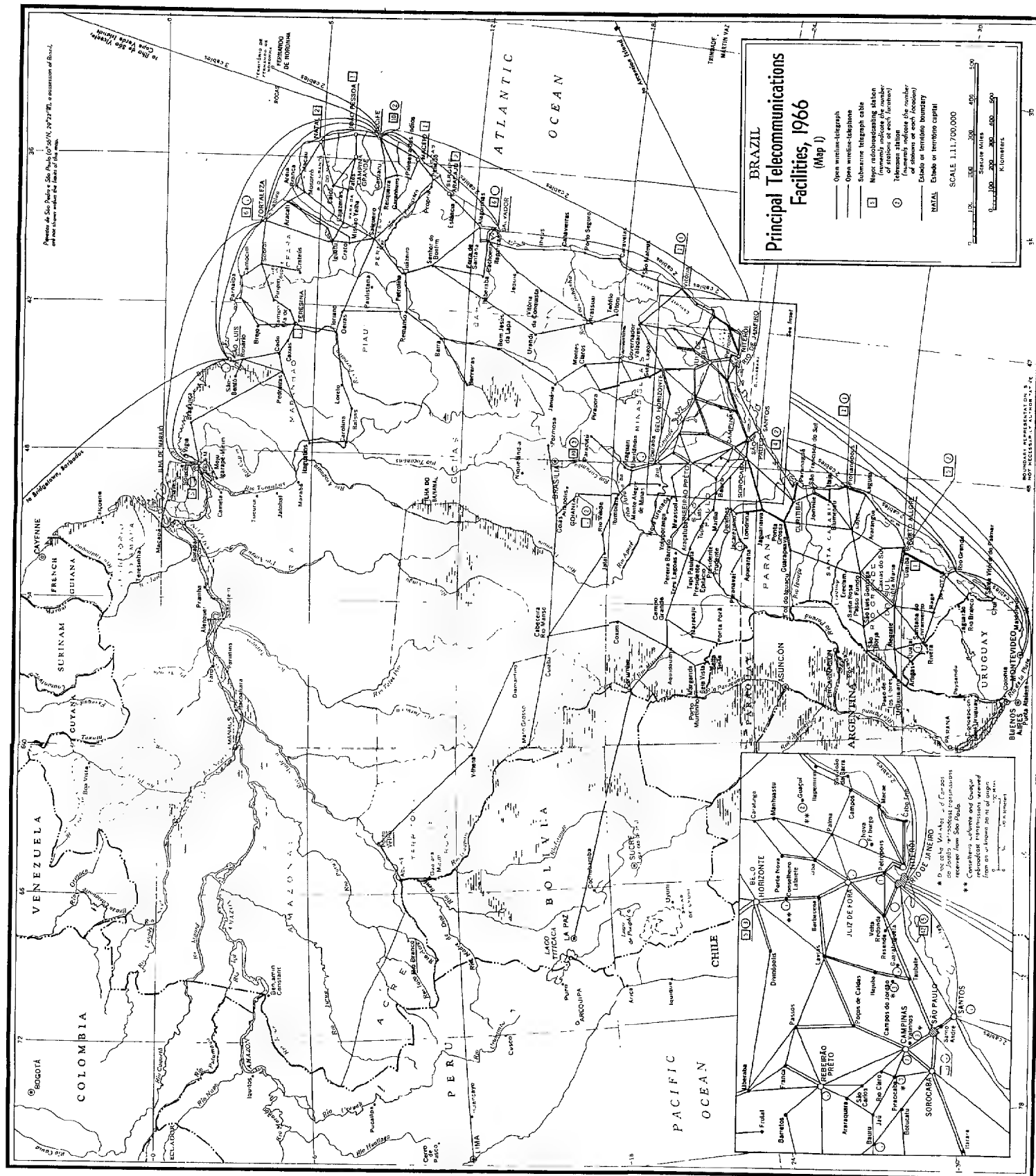
Brazil has several rather extensive special-purpose telecommunications systems, the most important of which are those of the military, the railroads, and the state police forces.

1. Military

The army, navy, and air force each operate telecommunications systems designed to service their own specialized needs. These systems use HF radio, microwave radio relay, and open wirelines. All of the networks have HF radio links between regional headquarters and their respective ministries in Brasília. The air force has greater communications capabilities than the other services, since it is normally responsible for civil aviation control. During an emergency the navy can enlarge its communications system by taking over the networks of the merchant marine and the oil industry.

2. Railroad

The railroads operate an extensive network consisting of open wirelines, HF radio, and microwave relay. The open wireline system provides telegraph circuits between minor stations, while the major stations are linked by HF radio. This system interconnects with the public network, thus extending common carrier communications into the more isolated areas of Brazil.





3. State Police

Many of the state police forces of Brazil have HF radio networks which connect the state capital with other state municipalities. For many of the smaller towns, this is the only telecommunications link with the outside world. At present, the state of Minas Gerais has a 58-station network and the state of Goiás has an 11-station network. Many of the state police networks now are being improved and expanded with the assistance of the US Agency for International Development.

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IX. Military and Internal Security Forces

A. General

The Brazilian military establishment, the largest in South America, consists of an army of 150,000, an air force with 28,100 personnel and nearly 900 aircraft, and a navy with 20 major combatant ships and 39,900 men, including 9,500 marines. These forces are supplemented by state military police forces totaling 114,050. The armed forces are capable of maintaining internal security and of defending the country against attack by neighboring countries, but they would be incapable of sustained defense against substantial forces of a major military power. The armed forces could conduct effective offensive operations against any neighboring country, with the possible exception of Argentina, but would be seriously handicapped by logistic difficulties except in the southern portion of the country. With outside logistic support, they could assist materially in hemispheric defense and provide a small expeditionary force, as they have in the past.

The strengths of the armed forces include a strong esprit de corps, the discipline of the enlisted men and their capability to operate under conditions of physical hardship, the generally high level of education of officers, and the experience of some of the officers in World War II, the Dominican Republic, and in the United Nations mission in the Gaza Strip. Weaknesses include dependence upon foreign sources for aircraft, naval vessels, and other major military items; the scarcity of specialists, technicians, and highly qualified noncommissioned officers; the illiteracy of many enlisted personnel and the frequent turnover of conscripts; the heterogeneous nature of equipment; and a restrictive military budget.

The armed forces of Brazil, especially the army, have been a major force in the efforts to consolidate the country economically and politically and to develop its communications and bring civilization to the underdeveloped regions of the interior. They have generally played the role of protector of the nation's traditions and defenders of constitutionality.

The post of Commander in Chief of the Armed Forces is held by the President of the Republic. He directs all activities concerned with national security and appoints the service ministers and chiefs of staff. He is assisted by the Presidential Military Staff, the National Security Council, and the Armed Forces General Staff.

The presidential Military Staff serves as the President's personal staff, assisting him on military matters, including relations with high military authorities. It is also responsible for his safety.

The National Security Council advises the president on matters of security, war planning, and conduct of war. The Council consists of the president, as its head, the ministers of state, the Chief of the Armed Forces General Staff, the chiefs of general staff of the army, navy, and air force, plus such other high-ranking officers and officials as the president may appoint.

The Armed Forces General Staff prepares plans involving joint organization and employment of the armed forces, provides staff support for wartime operational command of the armed forces, and assists in total mobilization in time of war. The Chief of the Armed Forces General Staff is a general or flag officer appointed by the president; the chiefs of the general staffs of the army, navy, and air force are also members. Subordinate to the Armed Forces General Staff are the Superior War College, the Brazilian Delegation to the Joint Brazil-United States Military Commission (JBUSMC), and wartime theaters of operations.

Except for the wartime functions of the Armed Forces General Staff, none of the president's advisory elements has operational control over the armed forces. Final responsibility and authority in army, navy, and air force matters are vested, respectively, in the Minister of the Army, the Minister of the Navy, and the Minister of Aeronautics.

B. Ground Forces

The Brazilian Army, the largest in South America, is capable of maintaining internal security and of defending the country against any combination of South American countries. The army has traditionally considered its principal mission to be defense against attack from Argentina. Its major troop concentration is in southern Brazil.

The army makes an important contribution to the national economy through the construction of roads, railroads, and dams, the suppression of smuggling, and flood and other disaster relief activities. A significant part of the army's effort is spent on civic action projects such as providing the general population in remote areas with medical care, instruction in reading, and assistance in land settlement. Since 1961, when organized rural unrest in northeastern Brazil appeared to offer

favorable opportunities for Communist exploitation, the army has given increased emphasis to internal security. Most of the independent units of less than division size scattered throughout Brazil have internal security as their primary mission, and the army is capable of controlling any overt internal threat to national security.

Although its combat capability compares favorably with that of other South American armies, the army has a number of weaknesses. Its funds are insufficient for the acquisition of new equipment, and many weapons are obsolete. Combat training is largely theoretical. The army is weak in organization, planning, and experience at division level and above, in noncommissioned officer leadership, and in all support services. It lacks the weapons and equipment required for mobilization and is dependent upon foreign sources for most heavy equipment.

The army, however, has certain important strengths. Esprit de corps, particularly among the officers, is strong, and military training is good in comparison with that in most Latin American armies. Many key senior officers had active combat experience in Italy during World War II. More recently, others have acquired useful experience with the Inter-American Peace Force in the Dominican Republic and with the UN mission in the Gaza Strip. Enlisted men are willing, amenable to discipline, and inured to hardship.

The army is divided into four numbered territorial armies and two special commands -- the Amazon and the Brasilia Military Commands -- all of which are directly under the Ministry of the Army. Subordinate to the armies and commands are 11 military regions. The numbered army is the highest tactical echelon. The division is the basic major unit and the echelon directly responsible for the tactical training of troops. Except for cavalry, division organization is based on US models.

The army's strength averages about 150,000, with 14,000 officers, 30,000 career noncommissioned officers, and the remainder conscripts (82,000) and volunteers (24,000). It is organized into 12 divisions (7 infantry, 4 cavalry, 1 armored), 1 mixed brigade, 3 coast artillery groups, 6 independent regiments (3 cavalry, 1 infantry, 1 airborne, 1 field artillery), and 41 separate battalions (20 infantry, 2 coast artillery, 2 field artillery, 3 armored, 1 anti-aircraft artillery, 3 military police, 7 engineer, 3 signal), and various service units.

Over 40 percent of the army is concentrated in the three southern states, with about one-third of total strength in the southernmost state of Rio Grande do Sul. Over 30 percent are in the four key industrial and agricultural states around Rio de Janeiro and São Paulo. Of the remainder, about half is in northeastern Brazil, and the balance is dispersed throughout the rest of the country.

Brazil has a growing capability to produce small arms and ammunition. Various models of pistols, revolvers, rifles, carbines, and submachine guns are now being manufactured by Brazilian industry in small quantities. In spite of this, the military and police still rely primarily on European and American small arms. The principal foreign small arms in use are: the Belgian FN FAL 7.62mm rifle, the Belgian M1908 Mauser 7mm rifle and carbine, the Belgian FN M1949 .30 cal. rifle, the US M1903 .30 cal. rifle, and the US M-1 .30 cal. rifle and carbine.

Most mortars, artillery, and military equipment are of US WWII vintage, but there is also a large inventory of widely differing, generally outmoded European equipment of French, Swedish, German, British, Danish, and Swiss origin. Brazilian industry supplies most mortars, artillery, ammunition up to 155mm, and light military vehicles.

Brazil has no long-range agreements with governments other than the US for supply of weapons or equipment.

Before World War II, training followed European, particularly French patterns. Since 1942, US methods have been introduced, especially through the Joint Brazil-United States Military Commission and the Military Assistance Advisory Group (MAAG) in Brazil. Since about 1950, MAP-supported units have followed US Army training programs, but progress has been slow. Although there are qualified instructor personnel, training is handicapped by insufficient funds, a shortage of facilities, much obsolete and nonstandard equipment, the low educational level of trainees, limited field exercises, and overreliance on theoretical instruction. Most of the first 3 months is devoted to close order drill, improvement of health and stamina, and instruction in reading, writing, and citizenship. Little time is available for unit training because of the 8-month conscript cycle. Unit training normally takes place in unrealistic small-scale field exercises held annually by various units and lasting a week or less.

Noncommissioned officers of the combat arms are trained in the School of Sergeants of Arms at Três Corações, Minas Gerais.

Advanced and specialized courses are provided in armored, coast artillery, medical, veterinary, physical education, communications, specialist training, airborne, and anti-aircraft schools.

Most officer candidates are trained at the Military Academy at Resende in the state of Rio de Janeiro. Higher schooling for officers is provided at the specialized schools mentioned above, at the Officers Advanced School at Vila Militar in the state of Rio de Janeiro, and at the Army Command and General Staff School at Rio de Janeiro. Selected officers receive more advanced training at the Superior War College, also in Rio de Janeiro. In recent years, many officers have received advanced branch and general staff training in the United States, and some officers and noncommissioned officers have been trained at the US Army School in Panama. The army makes excellent use of personnel trained by the United States, assigning many of them as instructors. A limited number of officers are sent to French and German military schools.

C. Naval Forces

The Brazilian Navy vies with the Argentine Navy as the largest in South America. It is capable of defending Brazil from seaborne attack by any neighboring country, but could offer only limited resistance against a modern naval force of comparable size.

The missions of the navy are to protect sea communications, coastal shipping, and river traffic and to defend the country against attack from the sea. Brazil is, in addition, committed to the defense of the Western Hemisphere in a patrol and anti submarine warfare (ASW) capacity. ASW capabilities have improved in recent years with the transfer of destroyers and submarines from the United States, and the participation of the Brazilian fleet in combined ASW exercises with US, Uruguayan, and Argentine naval forces.

The lack of naval base facilities outside of Rio de Janeiro has been a serious limiting factor in naval operations. The navy has begun a program of building outlying bases (notably at Belém, Salvador, Natal, and Recife) and is improving the relatively extensive facilities in Rio de Janeiro. There are drydocks in Rio de Janeiro and Belém capable of handling the largest navy ships, and naval and commercial facilities capable of handling all but the largest ships have been or are being built in other ports.

General policy matters are the responsibility of the Minister of the Navy. Overall control of the forces afloat is vested in the Chief of Naval Staff, who delegates authority for operational matters to the Vice Chief of Naval Staff. The Ministry of the Navy and the Naval Staff are mostly located in Rio de Janeiro. Parts of the ministry and staff have moved to Brasília. The headquarters of the operational forces are also in Rio de Janeiro.

The fleet is composed of several commands: cruiser division, destroyer flotilla, submarine flotilla, and mine force. Other operational forces afloat are the transport force, the hydrographic survey ships, two coastal patrol forces, and two river flotillas. The navy's one aircraft carrier operates directly under the Chief of Naval Staff.

Brazil is divided into seven naval districts each headed by a commandant. Headquarters of the districts are at Rio de Janeiro, Salvador, Recife, Belém, Florianópolis, Ladário, and Brasília. The naval district commandants exercise command over the ships, installations, establishment, forces, and naval personnel assigned to the districts.

The personnel strength of the navy is approximately 39,900 of which about 30,400 are in general service (4,000 officers and 26,400 enlisted men) and about 9,500 are in the marine corps (400 officers and 9,100 enlisted men). Some 12,500 officers and enlisted men serve afloat. A majority of naval and marine personnel, afloat as well as ashore, are based in Rio de Janeiro and its environs.

The Brazilian Navy consists of the following ships: 1 ASW support aircraft carrier (CVS), 2 light cruisers (CL), 9 destroyers (DD), 5 destroyer escorts (DE), 3 submarines (SS), 3 small submarine chasers (SC), 2 river gunboats (PR), 4 old coastal minesweepers (MSC [0]), 3 coastal surveying ships (AGSC), 2 surveying ships (AGS), 1 oceanographic research ship (AGOR), 2 gasoline tankers (AOG), 4 transports (AP), 3 auxiliary ocean tugs (ATA), 10 fleet ocean tugs (ATF), 1 battle damage repair ship (ARB), 1 floating drydock (ARD), 2 small auxiliary floating drydocks (AFDL), and 34 service craft. Most combatant ships were built in the US, UK, or Brazil. Many are of WWII or earlier construction. The condition of ships ranges generally from fair to good.

The major part of the fleet is based at Rio de Janeiro. The river gunboats, attached to the Mato Grosso Flotilla, are based at Ladário on the Paraguay River; 1 SC and 2 ATF are based at Recife; and 4 ATF and several service craft are based at Belém.

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The Brazilian Naval Air Arm (BNAA), a small, integral part of the Brazilian Navy, is under the Directorate of Naval Aeronautics, the Director General of which is directly responsible to the Chief of Naval Staff.

The BNAA is composed of 84 naval air personnel and 43 helicopters. It is not formed into tactical units. The aircraft carrier Minas Gerais is used jointly by aircraft of the navy and air force. All helicopters belong to the BNAA, and all fixed wing aircraft are in the air force inventory. Joint usage of the Minas Gerais has already improved ASW capability, but considerable basic and advanced ASW training will be necessary to develop this capability to its full potential.

Enlisted men receive basic training at apprentice seamen's schools. These schools offer a 10-month program, with courses in general grammar school subjects, elementary seamanship, and physical education. The effectiveness of basic training is seriously limited by the poor education of the recruits and by lack of equipment and qualified instructors. Enlisted personnel may be selected for specialist training after they have served 5 years in the fleet.

Candidates for commissions in the line, marine corps, and supply corps pursue a 4-year course at the Naval Academy. The academy courses are followed by a year of practical training before commissions are awarded.

US Navy training influence has been strong in the Brazilian Navy. There has been a US Naval Mission in Brazil almost continuously since 1922, and the Brazilian Navy has relied heavily on the United States for training and advice. In addition to the mission, there is a naval communications technical group and an air utility unit which give training support. Selected naval personnel are sent to the United States for specialized training. Various joint exercises have contributed to the close ties between the two navies.

The navy has approximately 30 days supply of ammunition, fuel, spare parts, and provisions on hand at all times, and the fleet can maintain itself at sea cruising at 14-16 knots for approximately five days. The navy itself has no tankers but has the ability to refuel at sea; if it refuels from the carrier and the two cruisers, it can extend the time at sea to 10 days.

The Naval Arsenal at Rio de Janeiro, the navy's major yard, has an extensive complex of facilities. It has assembled destroyers from imported parts and has built a number of ships,

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including patrol escorts (PF) and coastal surveying ships (AGSC). The Naval Arsenal can repair or overhaul any of the ships in the Brazilian Navy. Naval or commercial drydocks in Rio de Janeiro and Belém can accommodate any of the naval ships including the aircraft carrier.

The Corps of Naval Riflemen or marine corps has its own commander and is operationally subordinate to the Chief of Naval Staff. The primary missions of the marine corps are to provide security and defense of naval installations and to conduct land and amphibious operations essential to the prosecution of naval campaigns. The headquarters of the marine corps is at Rio de Janeiro. The Fleet Marine Force, also based at Rio de Janeiro, provides a mobile amphibious force in readiness and is the nucleus of a marine division. Guard units and security detachments, some of them embarked in the larger ships, provide a light infantry potential.

Present strength of the marine corps is approximately 400 officers and 9,100 enlisted men. They are moderately well trained and in a fair state of readiness. They would be capable of conducting amphibious landings with up to two battalions if the necessary sealift, air, naval gunfire, and logistic support were made available.

D. Air Force

The Brazilian Air Force (BAF) is the largest air force in South America. Despite budgetary limitations and shortcomings in logistics and training, its general capabilities are greater than those of any other South American air force. However, it would be ineffective against an attack by a major air power. The missions of the BAF include air defense, support of ground forces, internal security, protection of coastal shipping and the sea approaches to Brazil, the maintenance of essential air service in areas where private airlines do not operate, and the provision of civil aviation services of the type performed in the US by the Federal Aviation Agency and the Civil Aeronautics Board.

The BAF fighter squadrons, equipped with Meteor F-8 and T-33 jet aircraft, have demonstrated effectiveness in ground support exercises. The pilots are proficient and frequently give excellent demonstrations of precision acrobatics in formation. The Meteor and T-33 pilots have demonstrated high accuracy in air-to-ground firing with machineguns and rockets and in low-level bombing with napalm and high-explosive bombs. Although all fighter squadrons conduct tactical training, the absence of mobile ground-air communications equipment precludes

fully effective support of ground forces. Recently organized special commando flights of armed T-6's, assigned to the commanding officers of several airbases, are increasing the air force's counterinsurgency capabilities. The BAF does not envision the strategic employment of its bomber squadrons -- they are used mainly for training, reconnaissance, and communications -- and their aircraft have only a limited bombing potential.

In air defense, the BAF would be almost completely ineffective, since it has no all-weather fighters or early warning/ground-controlled intercept (EW/GCI) system. Its two air defense radar direction centers lack the equipment and trained personnel to become operational. Air defense would be hampered further by the lack of a coordinated antiaircraft artillery command, and the scarcity and obsolescence of antiaircraft weapons. The BAF reconnaissance squadrons have enough aircraft and combat-ready crews to support the other tactical units but are limited to visual observation. They can provide effective reconnaissance for army units. A search and rescue unit, which provides assistance in civilian disasters, could also support the ground forces.

BAF capabilities for antisubmarine warfare (ASW) are fair, but have been steadily improving since joint usage of the aircraft carrier Minas Gerais became a reality. Capabilities for antishipping operations, aerial mining, or support of amphibious operations are slight with no signs of any significant improvement in the near future.

Although the bulk of the air transport fleet is outmoded and half the C-47's are regularly grounded for maintenance and lack of parts, the BAF can fulfill its own requirements for air transport. It can also provide airlift for army paratroop operations and aerial resupply in the event of an internal uprising. It has successfully executed drops of from 150 to 300 paratroopers. To improve BAF air transport operations, the Ministry of Aeronautics purchased six AVRO 748 turboprop medium transports from the United Kingdom in 1962 and five C-130's from the United States in 1965.

Under a Mutual Defense Assistance Agreement with the United States the BAF has received both grant aid and reimbursable military assistance. Spare parts, electronic equipment, and technical advice are also provided under the MAP.

The Brazilian Air Force is headed by the Minister of Aeronautics, usually a senior air force officer. He reports directly to the president but is subordinate to the Chief of

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the Armed Forces General Staff on matters affecting other services. He directs the activities of the air force through the Air General Staff, eight directorates (personnel, training, health, quartermaster and finance, materiel, engineering, air routes, and civil aeronautics), the commands (Army Tactical, Tactical Navy, and Air Transport), which are, with the six air zones, the operational commands.

Headquarters for each air zone is located at the most important BAF base in the zone -- Val de Cães, Guararapes, Galeão, Cumbica, Gravataí, and Brasília. All air force tactical units, services, establishments, and activities located within an air zone are under the control of the air zone commander, a general officer, unless specifically exempted by the Minister of Aeronautics. Air zone commanders report directly to the Minister of Aeronautics, but they also deal with the directorates and the Air General Staff, as appropriate. Each commander has considerable latitude in discharging his responsibility for maintaining, training, and employing the units assigned to his zone.

The BAF has a personnel strength of approximately 28,100 including some 1,250 pilots, over 200 of whom are jet qualified. The aircraft strength is nearly 900, including about 100 jets, many of which are often nonoperational.

Most BAF personnel are volunteers. Officers are predominantly graduates of military schools, but a few are from civilian universities. There are no organized reserve units.

The BAF training system and facilities are good in comparison with those of other South American countries, but they are inadequate for a modern air force. The principal shortcoming is the absence of a program to provide progressive training in a particular specialty to individuals at different levels of experience and ability. Inefficient administration and the low educational level of the average trainee are additional complicating factors. The US MAP is aimed at improving the training system and expanding capabilities. Brazilian Air Force training is supplemented by the advisory support of the USAF Air Mission in Brazil and by the specialized training (advanced pilot training and instruction in maintenance and supply operations) of selected students in USAF schools in the United States and Panama.

Logistics is the responsibility of the Air General Staff. In general, the BAF logistic organization is characterized by poor planning and control. A major task of the USAF Section of the Joint Brazil-United States Military Commission is improvement of supply procedures and organization.

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The BAF is almost completely dependent upon foreign sources for aircraft and related equipment. Most of its aircraft are imported, principally from the United States; the Meteors and AVRO 748's came from the United Kingdom. Domestic factories produce liaison and trainer aircraft.

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2. The Police

The Federal Department of Public Safety (DFSP) is directly subordinate to the Ministry of Justice and carries out its operations through eight regional offices located in Rio de Janeiro and other major cities. The principal functions of the DFSP are:

- a. Controlling land and ocean borders and supervision of maritime, aerial, and border police.
- b. The prevention of crimes against the properties, works, and interests of the government.
- c. Providing for protection of the president, diplomats, and official foreign visitors.

The DFSP is the most effective government agency employed against Communist and other subversion. It works in close cooperation with the National Intelligence Service and the Intelligence Section of the Army Ministry.

The DFSP operates the National Police Academy, which provides training for all law enforcement agencies in Brazil.

Another DFSP department, the National Institute of Criminology, provides scientific and technical facilities for all police services. The DFSP's National Institute of Identification serves as a central repository for all criminal and civil identification records, which are made available to other police organizations.

Most normal law enforcement is carried out by the police forces of the 22 states and the Federal District Security Forces. Each state maintains military police forces (polícia militar -- military police, not to be confused with the regular military police in the army) and civil police, both of which operate on a statewide basis. The civil police can arrest, commit, and prosecute throughout the state but operate primarily in the capitals, while the military police concentrate on the hinterlands. Personnel strength ranges from several hundred in the smaller states to approximately 25,000 military police and 14,000 civil police in the state of São Paulo. In mid-1967 the total number of state military police was about 105,000 and civil police about 45,000. The military police, organized along army lines, are frequently headed by an active duty military officer and constitute a reserve component of the armed forces in times of emergency. State police organizations usually include a variety of special units such as highway police, railway police, forest police, and bank police.

Training, equipment, and files are usually inadequate for both the civil and military police. Communications facilities range from radio and teletype in the larger cities to telephone in the smaller but are often poor or nonexistent in rural areas. Many high-level officials are political appointees, not career officers, and the civil police, very poorly paid, are open to bribery.

The public distrusts the police; in some areas citizens prefer to forego justice rather than request police assistance. The military police, which is better trained and disciplined and also assists in educational and sports programs, is more respected than its civil counterpart.

Censorship of communications media, particularly motion pictures, is conducted by the Censorship Office of the DFSP. There is rather strict censorship of theater, cinema, and television, based on both political and moral standards.

In addition to the normal units each state police force contains a security organization; in Guanabara and São Paulo, for example, this component is called the Department of Political and Social Order (DOPS). Although lacking in modern equipment

and small in size -- the DOPS in Guanabara has approximately 300 members -- these units are usually among the more effective organizations working against Communists and other extremist groups. The DOPS also is charged with investigating political and social crimes, controlling the use of firearms and explosives, surveillance of aliens, and protecting the transportation system.

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F. Principal Diseases Encountered in Brazil

Carrier	Disease	Distribution	Prevention	Treatment	Comments
Housefly, unclean food & water	Bacillary dysentery	Widespread	Clean food & water; sulfaguani- dine if exposed	Aureomycin or sulfadiazine	Very prevalent
	Typhoid and paratyphoid fevers	Widespread	Inoculation	Chloromycetin	Very prevalent
Unclean food & water	Amoebic dysentery	Widespread	Clean food & water	Diodoquin	Less prevalent than bacillary dysen- tery
	Helminthic (worm) infestation	Widespread	Clean food & water	Tetrachloro- ethylene	In many areas 50% of the population may be infested and 30% may have multiple infections
Mosquito	Filariasis	Widespread, particularly in Amazonas	Mosquito repellent	Hetrazan and piperazine	As high as 30% of the population is infected in areas of Amazonas
	Malaria	Widespread	Mosquito repellent; primaquine	Chloroquine diphosphate	Eradication programs have eliminated most of the malaria infected mosquitoes in many of the states, but remote areas are still dangerous

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Carrier	Disease	Distribution	Prevention	Treatment	Comments
Mosquito	Yellow fever	Jungle areas	Inoculation; mosquito repellent	Essentially none	The mosquito vector is claimed to have been eradicated and only a few cases are reported; remote areas, however, always present a potential danger
Sandfly	Leishmaniasis	Widespread, with visceral form most prevalent in São Paulo and Ceará	Insect repellent	Infiltration of the ulcers of cutaneous form with quinacrine; treatment of visceral form with sodium antimony gluconate	
Rat flea	Plague	Rural areas	Inoculation	Streptomycin supported by sulfonamides	
Tick, louse, flea	Typhus	São Paulo (louse & tick borne); Minas Gerais (tick borne); Minas Gerais, Piauí, Ceará (louse & flea borne)	Inoculation	Chlortetracycline	Outbreaks are sporadic
Infected humans	Yaws	Widespread	General cleanliness; penicillin if exposed	Penicillin	Control measures have been in effect for several years but results are indeterminate

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Carrier	Disease	Distribution	Prevention	Treatment	Comments
Infected humans	Smallpox	Sporadic	Inoculation	Bed rest & supportive treatment	Epidemics occur sporadically in spite of vaccination campaigns
Infected animals	Brucellosis	São Paulo, Rio de Janeiro, Minas Gerais, Rio Grande do Sul	Avoid handling meat & dairy products from infected domestic animals	No feasible field treatment	
	Rabies	Sporadic	Avoid animal bites	Thorough washing of bite wounds; institution of rabies vaccine series	Bite victims should be evacuated as soon as possible from operational areas since rabies vaccine treatment in the field is impractical
	Anthrax	Widespread in animal husbandry areas	Avoid breathing dust in ground areas infected with anthrax spores	Penicillin; potassium permanganate on cutaneous lesions	
Reduviid bug (assassin bug)	Chagas' disease (American trypanosomiasis)	Minas Gerais, Goiás, Rio Grande do Sul, São Paulo, Paraná, and Paraíba	Insect repellent; DDT in quarters	Essentially none except supportive treatment	Disease usually becomes chronic with low death rate

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Carrier	Disease	Distribution	Prevention	Treatment	Comments
Mollusks (snails)	Schistosomiasis (blood flukes)	Northeastern & central eastern states	Avoid snail infested waters or wear protec- tive boots & clothing	Tartar emetic	A very serious chronic disease. Snail eradication efforts have been made in Bahia, Ceará, São Paulo, Espírito Santo, Minas Gerais, Paraná and other areas
Unknown	Pemphigus foli- aseus (an impetigo- like disease)	Central states	Unknown	Coal tar derivative called "Jamar- san", plus hydrotherapy and steam baths	Mortality was high at the last out- break in 1957

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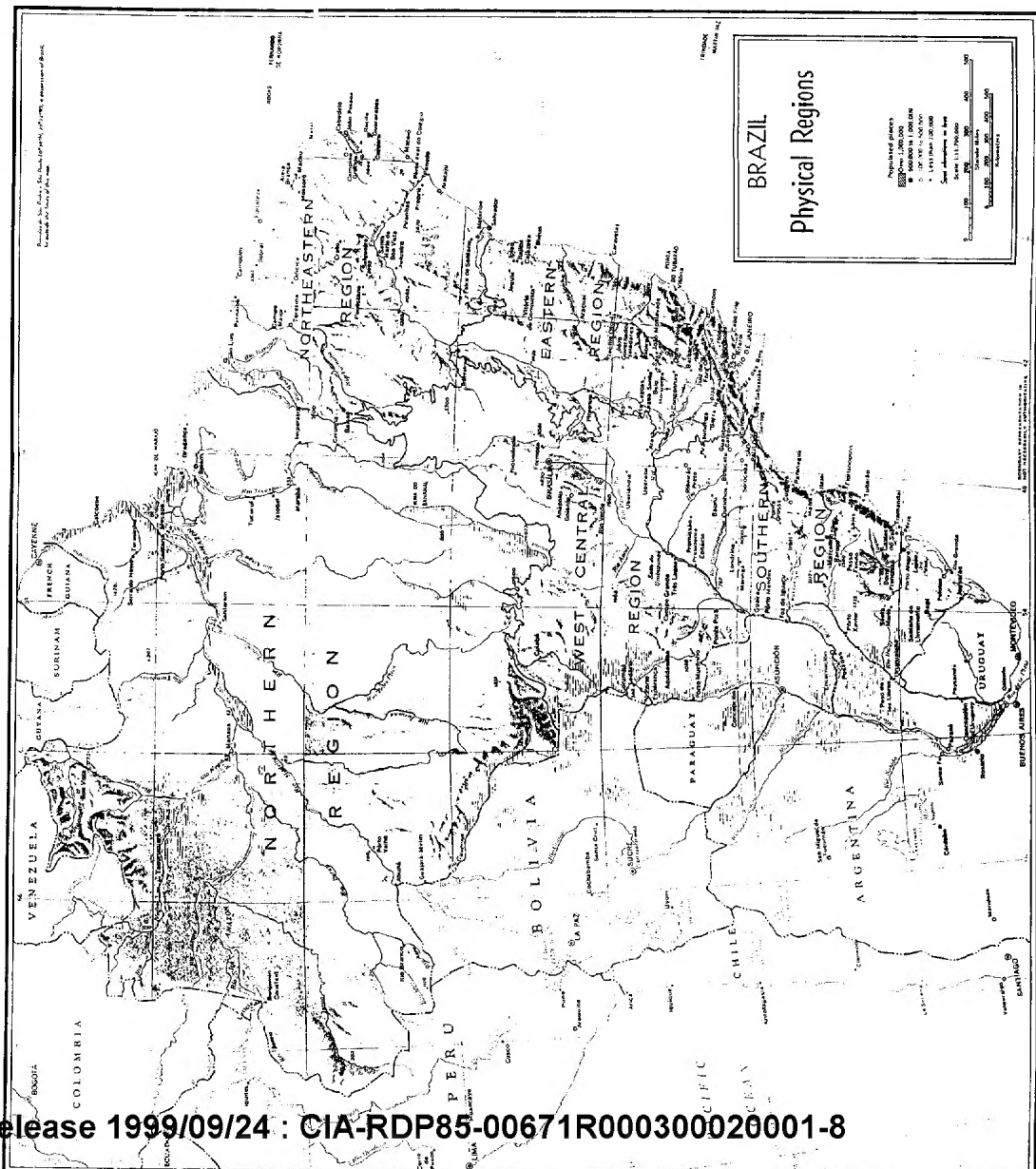
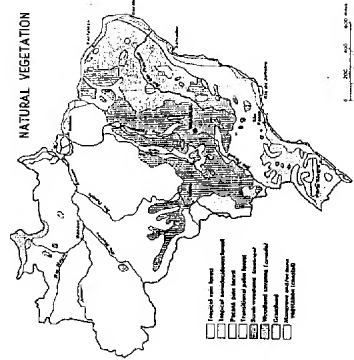
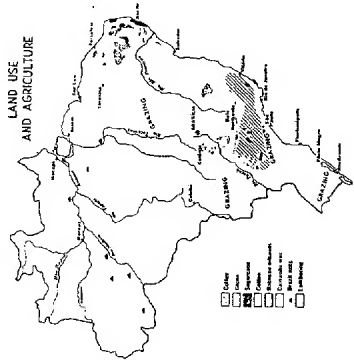
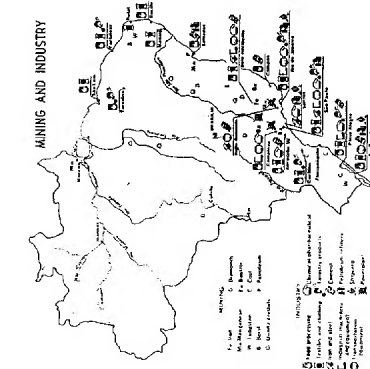
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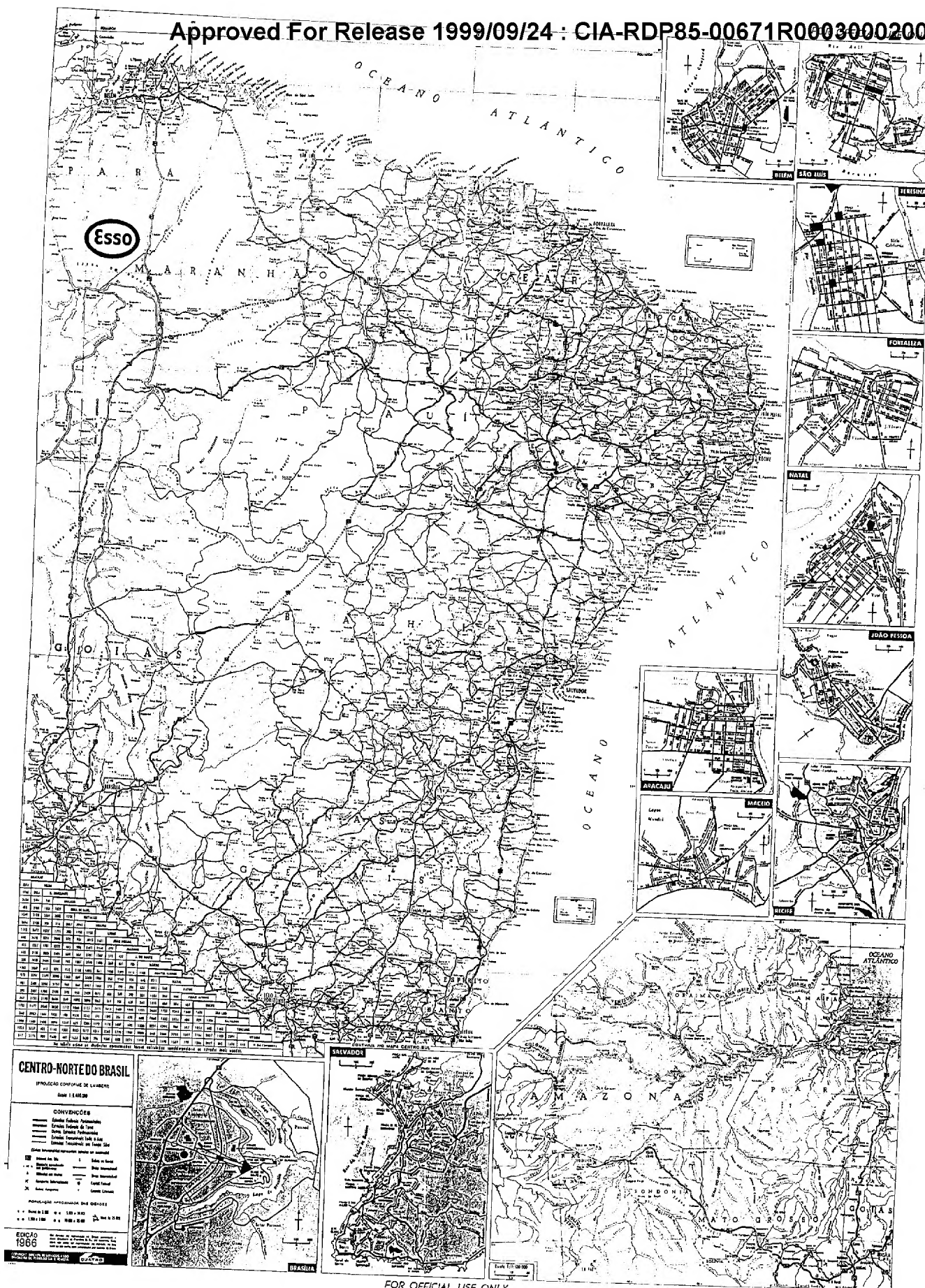
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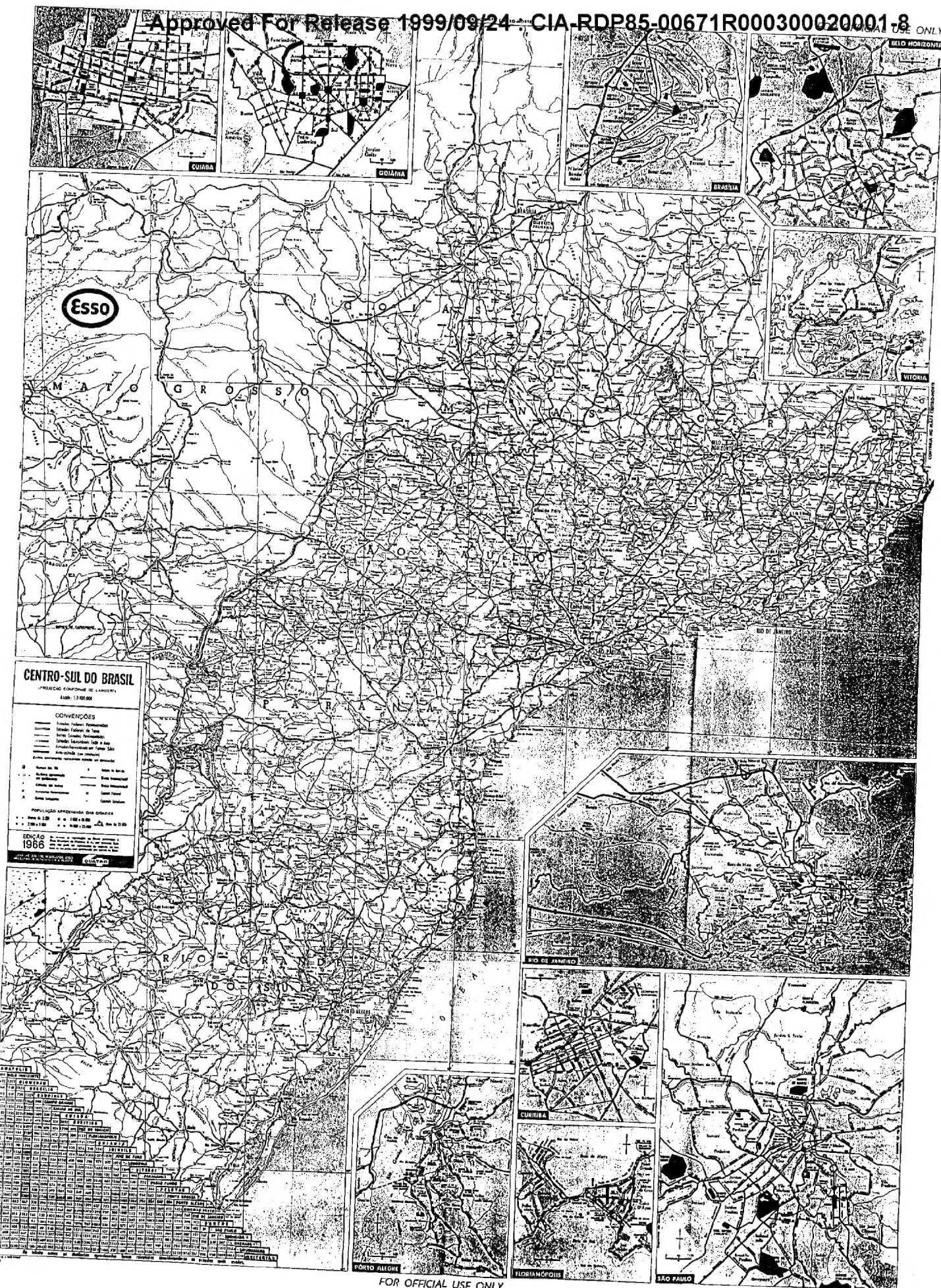
Recommended Films

1. Amazon Awakens. Walt Disney Studios, 1944, 16mm, sound, color, 33 min. CIA Film J7080.
2. The Amazon Family. International Film Foundation, 1961, 16mm, sound, color, 19 min. CIA Film P7063.
3. The Amazon -- People and Resources of Northern Brazil. Encyclopedia Britannica Films, 1957, 16mm, sound, black & white, 22 min. CIA Film N6271.
4. Brasília -- David Brinkley's Journal. NBC/TV, 1963, 16mm, sound, black & white, 29 min. CIA Film S6215.
5. Brazil. NBC/TV, 1962, 16mm, sound, black & white, 16 min. CIA Film R6499.
6. Brazil. US Army, 1953, 16mm, sound, black & white, 17 min. CIA Film J6726.
7. Brazil -- The Gathering Millions. National Educational Television, 1965, 16mm, sound, black & white or color, 60 min. CIA Film V6500.
8. Brazil -- People of the Highlands. Encyclopedia Britannica Films, 1957, 16mm, sound, color, 19 min. CIA Film K6995.
9. Brazil -- Rude Awakening. CBS/TV, 1961, 16mm, sound, black & white, 54 min. CIA Film P7001.
10. Brazil, the Takeoff Point -- Changing World. National Educational Television, 1964, 16mm, sound, black & white, 59 min. CIA Film V6247.
11. Brazil, the Troubled Land. ABC/TV, 1964, 16mm, sound, black & white, 27 min.
12. Forty Million Shoes: A Report on Brazil. Canadian Broadcasting System, 1961, 16mm, sound, black & white, 61 min. CIA Film R6188.
13. Geography of South America: Brazil. Coronet Films, 1961, 16mm, sound, color, 14 min. CIA Film P7027.

14. Have Patience, Brazil is Big. ABC/TV, 1964, 16mm, sound, black & white, 34 min. CIA Film T6787.
15. The Head Men. National Film Board of Canada, 1963, 16mm, sound, black & white, 28 min.
16. The Thin Edge -- Chet Huntley Reporting. NBC/TV, 1962, 16mm, sound, black & white, 33 min. CIA Film S6072.
17. Three Apprentices. National Film Board of Canada, 1963, 16mm, sound, black & white, 28 min.







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